TECHNOLOGY DEPT

A PICTORIAL SURVEY OF CURRENT PRACTICE, EQUIPMENT AND MATERIALS

Construction Methods

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BOEING FIELD RUNWAYS paved with concrete placed by pair of dual-drum mixers.

JANUARY 1945

INLAND
STEEL SHEET PILING
Made of special analysis steel providing unusual toughness and high tensile strength. The Inland Interlock permits free driving, yet remains watertight under pressure.
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SHEETS · STRIP · TIN PLATE · BARS · PLATES · FLOOR PLATES
STRUCTURALS · PILING · RAIL · TRACK ACCESSORIES · REINFORCING BARS

CURRENT JOBS

. . . and Who's Doing Them

BUILDINGS

Public—Navy contract for housing at Shumaker, Ark., was awarded to **Winston Bros. Co., C. F. Haglin & Sons, Inc., Missouri Valley Bridge & Iron Co.,** and **Sollitt Construction Co., Inc.,** of Minneapolis, Minn., for $28,118,700. Another $10,395,189 Navy contract for naval supply depot near Stockton, Calif, went to **Ford J. Twaits Co., Morrison-Knudsen Co., Inc.,** and **Ben C. Gerwick, Inc.,** of Los Angeles. Tire plant at Des Moines, Ia., will be built by **Geo. Sollitt Construction Co.,** of Chicago, Ill., for $1,700,000. **John A. Johnson Contracting Corp.,** of Brooklyn, N. Y., has contract for $2,504,001 hospital at Lebanon, Pa. Low bid of $1,675,000 for buildings at Los Angeles, Calif., was submitted by **Robert E. McKee, Inc.,** of Los Angeles. Navy contract for personnel structures at Port Chicago, Calif., went to **MacDonald & Kahn, Inc.,** of San Francisco, for $1,639,361. **Shumaker & Evans Construction Co.,** of Los Angeles, Calif., will build family dwellings at Oceanside, Calif., for $1,374,382. Army contract for work at Sandusky, Ohio, ordnance depot was awarded to **E. D. Badger & Sons Co.,** of Boston, Mass., for $1,104,546.

Industrial—Contract for gasoline mfg. plant at Winnie, Tex., was awarded to **Stone & Webster Engineering Co.,** of Houston, for $4,000,000. Plant at Brookfield, Ill., will be built by **R. Benson,** of Chicago, for $2,500,000. **Stone & Webster Engineering Co.** will build plant at Gardena, Calif., for $1,796,000. **Arthur G. McKee & Co.,** of Cleveland, Ohio, has $1,400,000 contract for plant at Rouseville, Pa. **United Engineers & Construction Co., Inc.,** of Philadelphia, was awarded $1,250,000 contract for plant at Altman, Tex., and $1,200,000 contract for plant at Sun Ray.

Commercial—Hotel at Norfolk, Va., will be built by **Muhleman & Kahoe, Inc.,** of Richmond, for $2,300,000.

HEAVY CONSTRUCTION

Piers at Hunters Point, Calif., will be built for Navy by **Gerwick, Morrison-Knudsen and Twaits,** of San Francisco, for $1,676,965. **Lewis & Frisinger Co., E. B. Schwaderer Co.** and **Julius Porath & Son,** of Ann Arbor, Mich., will build $1,675,534 airport at Aultman, Ohio. Airport improvements at Parkersburg, W. Va., will be built by **Ralph Meyers Construction Co.,** of Salem, Ind., and **Western Contracting Corp.,** of Sioux City, Iowa, for $1,655,000. **Sternberg Dredging Co.,** of New Orleans, La., has $1,362,400 Army contract for uncompacted fill on levees. Navy contract for runways at Anacostia, D. C., was awarded to **J. C. Langenfelder & Son,** of Baltimore, Md., for $1,348,786.

HIGHWAYS

Among recent highway contracts awards are the following: California: $1,263,077 to **J. A. Casson Co.** and **N. M. Ball Sons,** of Hayward, Illinois: $656,000 to **Massman Construction Co.,** of Kansas City, Mo. Iowa: $223,053 to **Maudlin Construction Co.,** of Webster City. Louisiana: $232,111 to **W. R. Aldrich & Co.,** of Leesville. New York: $237,243 to **Lane Construction Co.,** of Meriden, Conn. Pennsylvania: $746,781 to **Booth & Flinn,** of Pittsburgh, and $1,225,752 and $672,262 to **Potts & Callahan Construction Co., Inc.,** of Baltimore, Md. Texas: $819,000 to **Texas Bitulithic Co.,** of Dallas. Virginia: $344,363 to **W. H. Scott, Inc.,** of Franklin. Washington: $214,258 to **Hawkins & Armstrong,** of Seattle. Wisconsin: $261,430 to **L. G. Arnold, Inc.,** of Eau Claire.

CONSTRUCTION METHODS was founded in 1919, under the name of SUCCESSFUL METHODS, by the Manufacturers Publicity Bureau, Inc., of Chicago, representing a group of non-competing manufacturers of construction equipment. Charles R. Thomas, editor of the first few issues, was succeeded by William Jabine.

In 1926 the McGraw-Hill Publishing Company, Inc., of New York, purchased the publication, changing its name to SUCCESSFUL CONSTRUCTION METHODS in November of that year, to CONSTRUCTION METHODS in May, 1927, and to CONSTRUCTION Methods and Equipment in December, 1936. In October, 1939, the name CONSTRUCTION METHODS was resumed.

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Robert K. Tomlin was appointed editor of CONSTRUCTION METHODS in January, 1928. Vincent B. Smith is associate editor; N. A. Bowers, Pacific Coast editor; Nelle Fitzgerald and Patricia McGerr, assistant editors, Paul Wooton and A. N. Carter, Washington representatives.

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Construction Methods

A Pictorial Survey of Current Practice, Equipment and Materials

JOHN ABBINK, Publisher

ROBERT K. TOMLIN, Editor — A. E. PAXTON, Manager

Editorial Staff: Vincent B. Smith; Paul Wooton and A. N. Carter (Washington) N. A. Bowers (San Francisco) Nelle Fitzgerald Patricia McGerr

JANUARY, 1945

THE *How* OF IT

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

How **CHINESE AND AMERICAN ENGINEERS** work together to repair Burma Road —p. 59

How **GRAVEL** was provided for surfacing supply roads in France —p. 60

How **POST-WAR CONSTRUCTION** is being planned by state highway departments —p. 62

How **RUNWAYS AND APRONS** at Boeing Field were paved with concrete in 25-ft.-wide slabs with thickened edges —p. 68

How **EARTH ROADBED** was waterproofed by stabilizing agent of treated resin and chemicals mixed in place as dry powder —p. 70

How **AIR-ENTRAINED CONCRETE** was supplied by truck mixers for airport runways —p. 74

How **TRANSVERSE DUMMY CONTRACTION JOINT** was temporarily filled with steel mold strips —p. 75

How **BATCHING PLANT** equipped to weigh batches up to 5-yd. volume loaded one truck mixer per minute —p. 77

How **BITUMINOUS RESURFACING** improved 250 miles of New York state highway —p. 78

How **REPAIR SHOPS** kept Kansas road equipment ready for duty —p. 80

How **EARPHONE** was used to locate underground leaks in water distribution system —p. 82

How **TRACTOR-DRAWN SWEEPER** was used to fill voids in bituminous concrete pavement at airport —p. 82

How **STEEL** was moved without use of crane by means of special wrench at shipyard —p. 83

How **ACCESS ROAD** was built to timberland to relieve pulpwood shortage —p. 84

How **PAVEMENT** was widened and old bridges replaced to improve strategic highway —p. 86

How **HIGHWAY MAINTENANCE** carried on despite wartime shortages —p. 88

How **200 BITUMINOUS REPAVING CONTRACTS** improved Boston streets —p. 92

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JAMES H. McGRAW, Founder and Honorary Chairman

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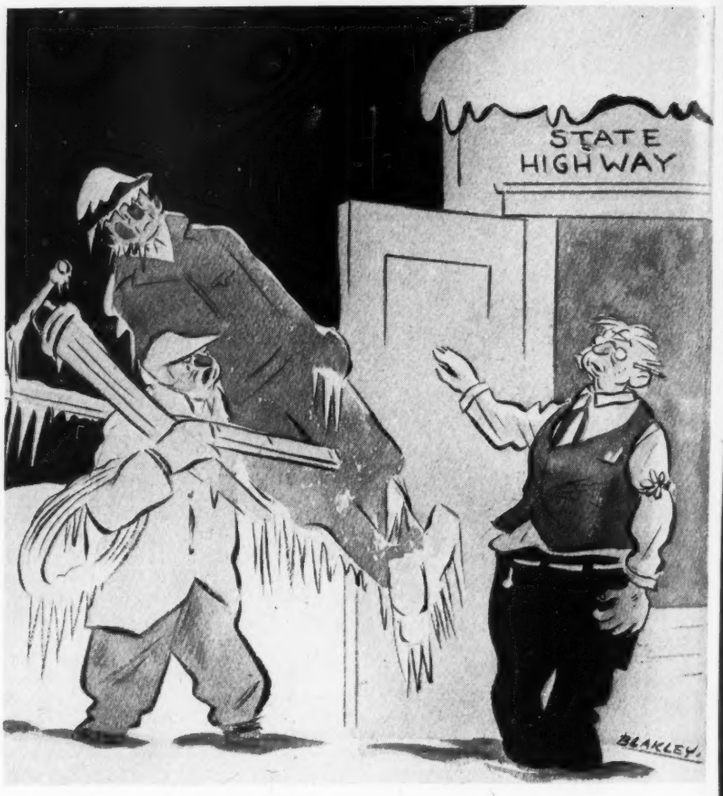
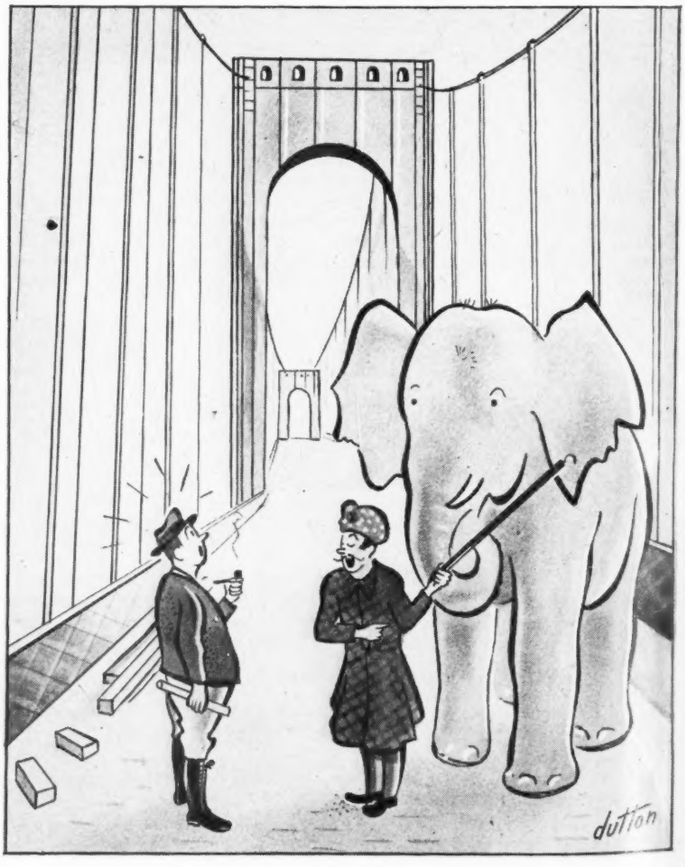
THE JOB JESTER

CARTOONS DRAWN FOR CONSTRUCTION METHODS



"Well, what are you staring at? Haven't you ever seen a survey crew coming in from winter field work?"



"I'm testing bridge floors for the State Highway Department!"

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PLANT addition for Lion Manufacturing Corporation, Chicago, was built in dead of Winter. Selective concreting—using Lone Star Cement for footings and 'Incor' 24-Hour Cement for superstructure—cut form, time and heat-protection costs to the bone. Work went ahead steadily, even in sub-freezing weather.

'Incor' did its part so well it was also used for driveways and in resurfacing main-plant floors, where wear-resistance and early use were 'musts'. Coath & Goss, Inc., General Contractors . . . Engineering Systems, Inc., Designing Engineers, both of Chicago.

Forms and heat-protection cost real money . . . save both by using 'Incor'* wherever dependable high early strength shows you a profit. *And it usually does!* Write us at 342 Madison Ave., New York 17, for "Winter Concreting Book."

*Reg. U.S. Pat. Off.

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HAUL YOUR MATERIALS TO THE JOB WITH A LITTLEFORD SUPPLY TANK

"Frameless" Construction Semi-Trailer Model No. 103 Supply Tank

Model No. 102

Model No. 103

When on those big Bitumen Spraying Jobs, keep the Pressure Distributors at work by doing the hauling in a Littleford Supply Tank. Let the Supply Tank operate from the tank car or storage tank to the job.

These Supply Tanks speed up Highway Construction or Maintenance, make it possible to save hours of time.

Littleford Supply Tanks are made in Two Wheel, Four Wheel, or Truck Mounted Models, with Heating Systems or without. Semi-Trailer Frameless Construction Supply Tanks, Models No. 102 and No. 103 are standard. This is the Tank without the Trailer feature, an exclusive Littleford Feature.

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Have you received yours?

These interesting and helpful books are

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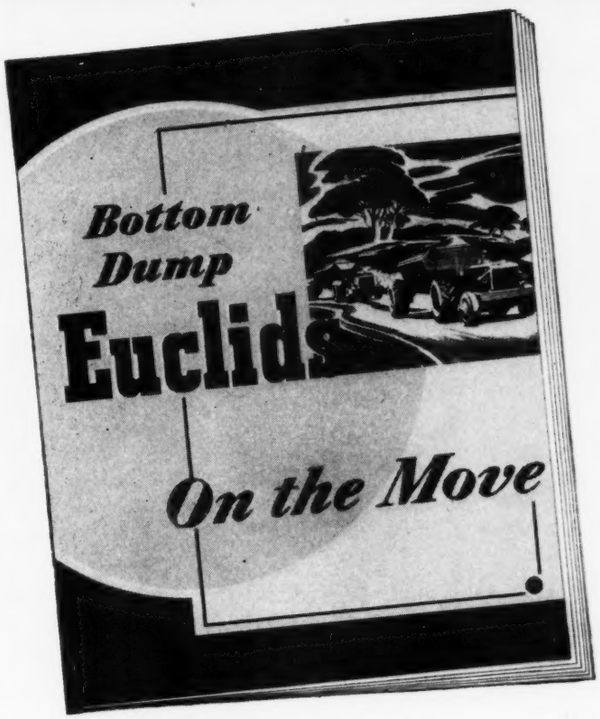

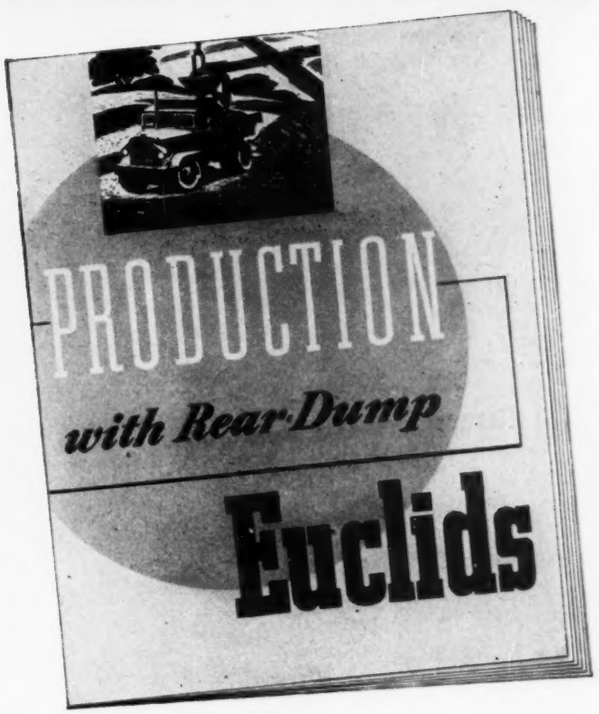

If you use off-the-highway hauling equipment of any kind, you'll want copies of these two new books. Each contains a large number of illustrations and descriptions of mining, construction and quarry jobs on which Euclids have helped to increase production and cut costs on all lengths of haul.

A note on your letterhead will bring your copies of these books promptly, along with any information on Rear-Dump and Bottom-Dump EUCLIDS that you would like to have. Your request can be addressed to the nearest Euclid Distributor or to us direct, as you prefer.

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EUCLID SELF-POWERED HAULING EQUIPMENT For EARTH ROCK COAL ORE

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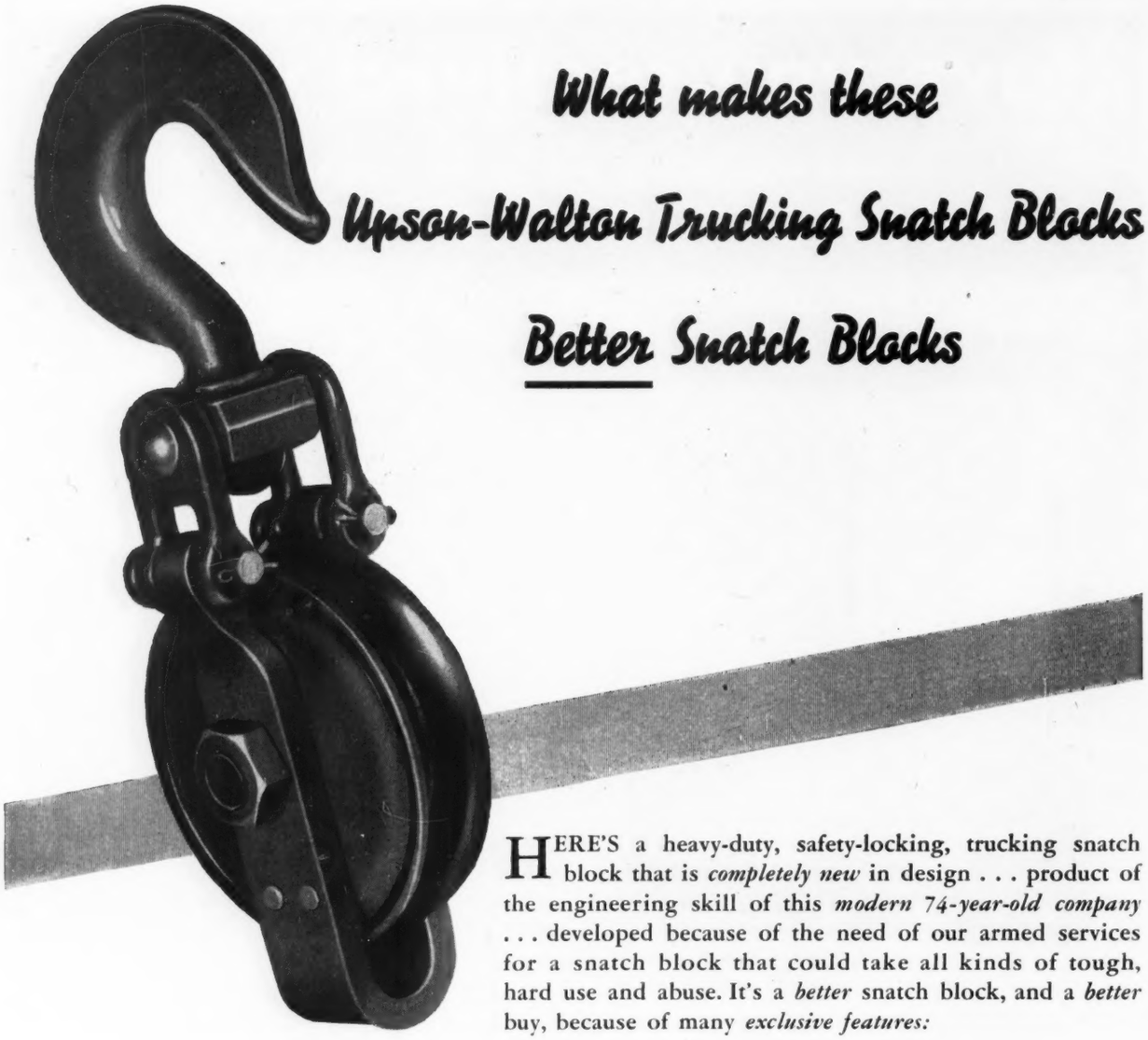

HERE'S a heavy-duty, safety-locking, trucking snatch block that is *completely new* in design . . . product of the engineering skill of this *modern 74-year-old company* . . . developed because of the need of our armed services for a snatch block that could take all kinds of tough, hard use and abuse. It's a *better* snatch block, and a *better* buy, because of many *exclusive features:*

AS WE GO TO PRESS, DELIVERIES ON UPSON-WALTON TRUCKING SNATCH BLOCKS ARE GOOD

EXTRA HEAVY FORGED STEEL SHELL PLATES: recessed for sheave to prevent jamming of rope. Rope positively cannot work in between shell plate and sheave. Lateral or offset pulls will not spring or bend the shell plate.

NEW DESIGN SWIVEL HOIST HOOK: extra heavy construction, drop-forged steel; provides a greater safety factor.

EXTRA HEAVY ONE-PIECE STRAP with forged eye connections. Strap and shell plates are riveted securely together.

EXTRA HEAVY CROSSHEADS, swivel links, safety links and pins.

HEAVY DUTY CAST STEEL SHEAVE: longer wearing. Heavy sections in tread and flanges of sheave—rope cannot wear through.

LARGE CENTER PIN: pressure alemite fitting is recessed into the center pin for easy lubrication.

STEEL SLEEVE OVER CENTER PIN materially increases bearing diameter, insuring longer life.

HEAVY BRONZE BEARING, pressure alemite lubricated.

U-W

Established 1871

THE UPSON-WALTON COMPANY

Manufacturers of Wire Rope, Wire Rope Fittings, Tackle Blocks

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The tire with the built-in rock absorber

A typical example of B. F. Goodrich development in rubber

WHEN one of these big tires hits a rock, it's a piledriver blow, a sharp impact with tons behind it. And rocks just can't always be avoided in off-the-road service. Big four and five-foot tires are costly (the rear tires in the picture cost $650 apiece). Often, under impact, these tires bruised, blew out. This meant expensive delays, repairs, or discarding the tire.

B. F. Goodrich engineers set to work, developed a new principle of tire construction, put a "rock absorber" or *shock shield* under the tread to provide greater protection against separation, bruising and blow-outs. The shock shield is a set of four breakers, layers of rubber-coated rayon cord fabric, insulated with cushions of special shock-resisting rubber.

Under impact the cords in these breakers stretch together—not across each other—and return to their original position, distributing the force of the blow and allowing it to be absorbed by the rubber between them. Thus the shock passed on to the cord body of the tire is greatly reduced.

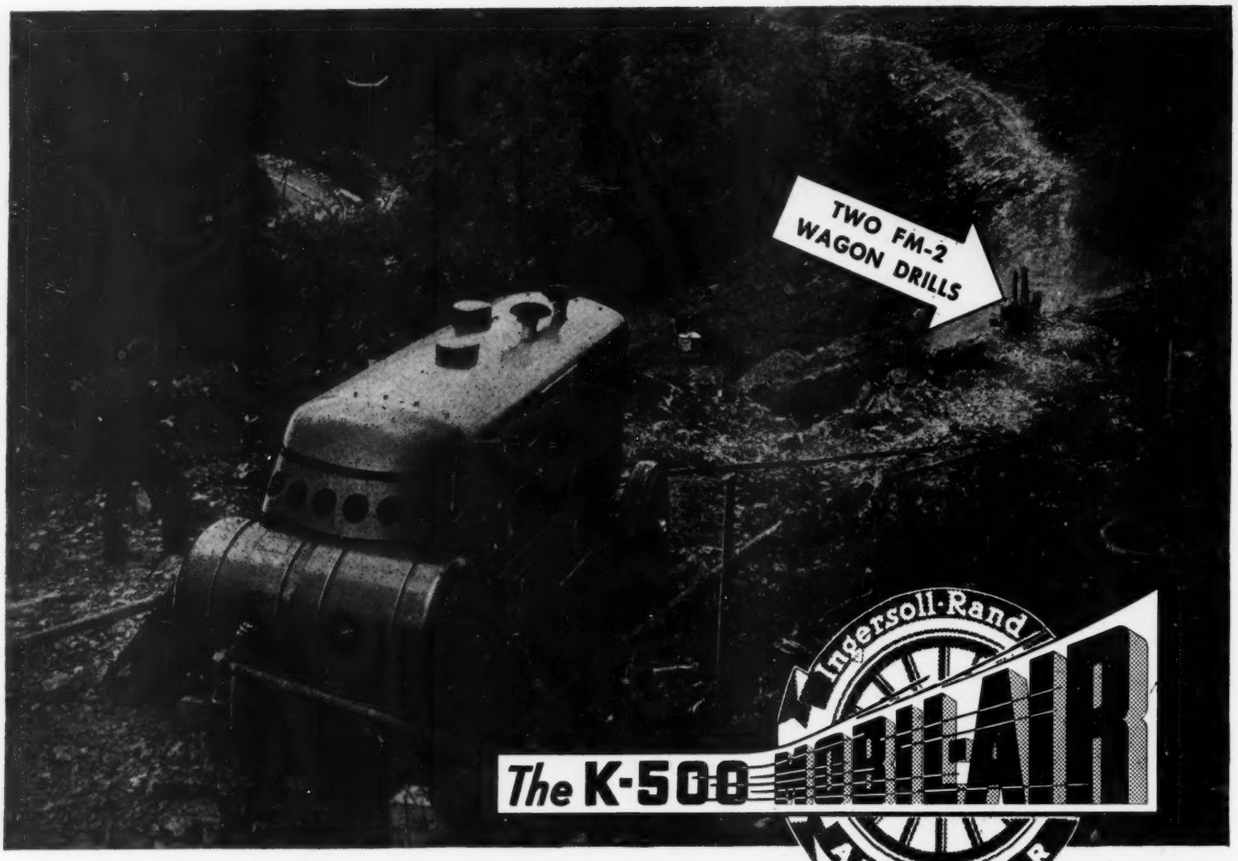
Users say their records show B. F. Goodrich tires built this way often last twice as long. Repair bills are cut. Delays reduced.

This development is typical of those going on constantly at B. F. Goodrich.

We urge every user of off-the-road equipment to try B. F. Goodrich tires alongside of other makes. Keep accurate service records. Compare natural rubber tires with natural rubber, synthetic with synthetic, and prove to yourself that you can save money with B. F. Goodrich tires.

Supplies of most sizes of off-the-road tires are strictly limited. It is well to place tentative orders early. See the local B. F. Goodrich dealer for information, or write us direct. The B. F. Goodrich Co., Akron, Ohio.

B.F. Goodrich
Truck & Bus Tires



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500 cubic-foot Portable Compressor

And here are some other things you should know about the machine that revolutionized portable compressor practice in 1939:

1 It's the only 500-cfm portable available with a gasoline engine as well as an oil engine. (See ★ below).

2 Weighs only 10,600 pounds... the lightest 500-cfm machine available.

3 Big enough to run two powerful FM-2 wagon drills.

4 Small enough and tough enough to go trail-blazing over mountains and through swamps.

5 Drill-More multi-speed regulator makes the machine even more efficient at half load than at full load. When running only one wagon drill or lighter drills, no more fuel is required than if a smaller compressor were used.

6 Multi-speed regulation of portable-compressor capacity was originated by Ingersoll-Rand... introduced with the K-500. The average working speed of compressor and engine is lower... more efficient ...less wear.. longer life.

7 Spring mounting and automotive-type steering are standard.

8 Electric cranking with commercial 12-volt equipment is standard for oil as well as gasoline engine. Both engines are easily hand-cranked.

9 "Finger-tip" control of heavy-duty, easily maintained clutch.

10 All operating controls and gauges are centrally located.

11 Low, easily filled fuel tank.

12 Proven design, performance, stamina, and reliability... used all over the world.

★**13** Quickly convertible from operation on one fuel to another (oil, gasoline, or natural gas) by substituting external fuel accessories only.

★**14** Astonishingly low gasoline consumption presents a new consideration in the choice between oil and gasoline drive.

★**15** For oil, it's the well-known I-R Type H engine ...smooth running, easy to maintain, easy to start.

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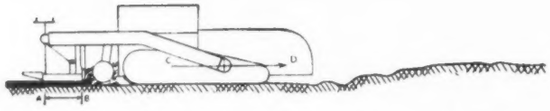
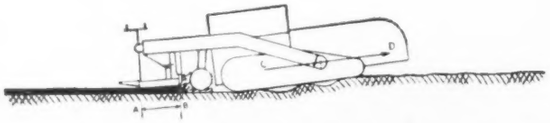
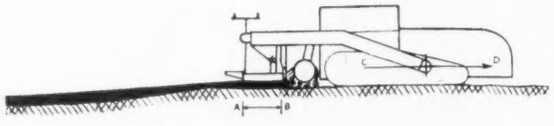
HOW A B G FINISHER LEVELS OVER THE BUMPS



With the screed adjusted for a given thickness, its under-surface, "AB," is kept parallel with the line "CD" by means of a long leveling arm.



As the crawler moves to a higher point, the screed bottom, "AB," is automatically tilted up, seeking to remain parallel with the line of pull, "CD."



The screed will then climb upward until the line "AB" is again completely parallel to the line "CD." Thus, the mix is tamped into the depression, leaving a smooth, gently-rising surface.

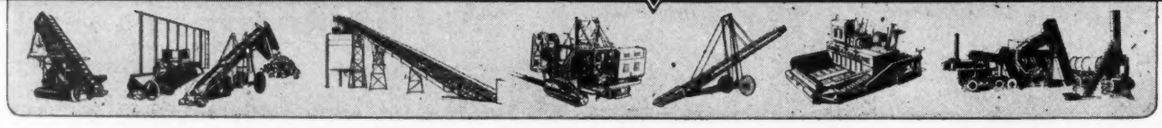
• Dangerously cracked and broken pavements are restored to a safe surface . . . traffic-trampled highways are transformed into smooth-riding roads with the aid of the leveling device on a Barber-Greene *Tamping-Leveling* Asphalt Finisher.

Two pivoted arms connect the tractor and screed units. These long arms account for the delayed action of the screed when the machine is climbing or descending to any new level. A rise or fall of several inches in the tractor unit is reflected only slightly on the screed plate, preventing sharp depressions or bumps in the final surface.

As the crawlers change level, the level of the screed is automatically, but *gradually*, altered—for it constantly seeks to keep in line with the direction of pull. And, helping to make the finished surface smoother still are the long tractor crawlers that bridge a large number of the depressions. Consequently, many changes in the level of the screed plate are avoided. For complete details on the leveling principle of the B-G Finisher write for Catalog 879. Barber-Greene Company, Aurora, Illinois.

45-1

Barber-Greene B G *Constant Flow Equipment*



What to do about Rust?

Make this Test

Immerse any rusty nail in a small quantity of Cities Service Rust Remover. If badly rusted, allow to remain for several minutes. You can actually see the rust dissolve.

See the Results

Remove nail and wipe dry with cloth or tissue. Note the complete absence of rust and the way the original surface reappears.

CITIES SERVICE RUST REMOVER has been tested for four years throughout a small, highly industrialized area in the East, where it has earned a unique reputation for performance. RUST REMOVER is a clean, clear liquid, practically odorless, non-inflammable, easily applied, and harmless to handle by those not allergic to specific chemicals. It is fast-acting, and, although heating somewhat accelerates results, general application is recommended at normal temperature (60°-90°F.). RUST REMOVER is effective on chromium, copper, aluminum, steel and iron.

5 Big Advantages

1. Non-Inflammable
2. Harmless to Normal Skin
3. Makes Metals Chemically Clean
4. Removes Rust by Chemical Action
5. Free from Muriatic, Sulphuric, Nitric and Oxalic Acids or Cyanide.

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The Self-Propelled Lorain handling yard stock

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A Lorain 80 putting down 50' bridge piling

Two Moto-Cranes place a huge filter tank

Whether it's driving piles, putting up steel, juggling massive machinery, slinging cement, handling loose materials or any one of a hundred other crane jobs, there's a Lorain crane with proper mounting, boom and equipment to fit the job to a "T". These wide choices show you how it's possible to pick the right Lorain for the job . . . for greatest efficiency and most profit:

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Large crawler cranes up to 31 ton capacity. Small crawler cranes up to 10½ ton capacity. Rubber tired Moto-Cranes, 15 and 20 ton capacity (20 ton is 6-wheel drive).

Rubber tired self-propelled crane, 20 ton capacity.

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Clamshell buckets, dragline buckets, orange peel buckets, skips, grabs, concrete buckets, slings, grapples, skull crackers, hook blocks, tongs, special hooks, magnets, LCL containers.

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All-welded, light in weight, strong. Center sections easily inserted to provide any length of boom required. Straight tip extensions, gooseneck tip extensions, and so on.

Next time you have a crane job, let a Lorain distributor show you the perfect match for it . . . and the surest way to greater profits on your next contract.

Reg. Trade Mark

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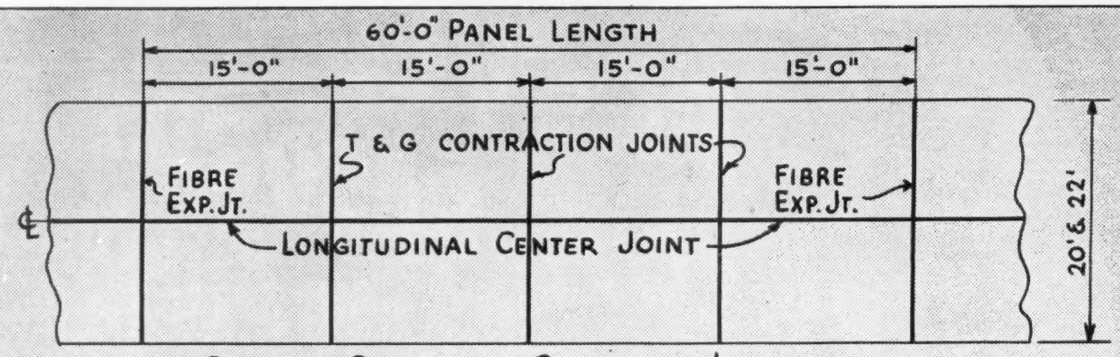
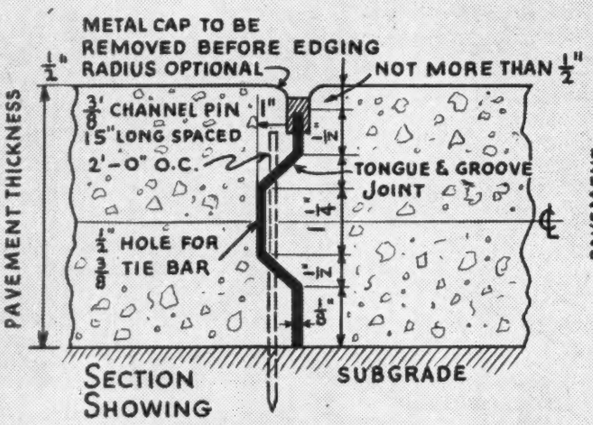
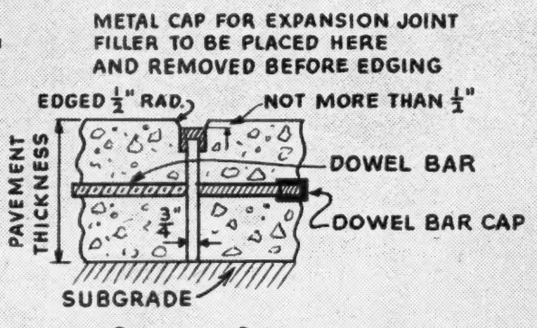


PLAN OF PAVEMENT SHOWING JOINTS

NOTE:- LENGTH OF PANEL BETWEEN EXPANSION JOINTS OPTIONAL BUT CONTRACTIONS TO REMAIN 15' CENTERS


METAL CAP TO BE REMOVED BEFORE EDGING
RADIUS OPTIONAL
NOT MORE THAN ½"
PAVEMENT THICKNESS
CHANNEL PIN 15" LONG SPACED 2'-0" O.C.
TONGUE & GROOVE JOINT
½" HOLE FOR TIE BAR
SUBGRADE

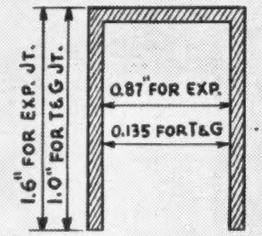
SECTION SHOWING TONGUE & GROOVE LONGITUDINAL CENTER JOINT & CONTRACTION JOINT


METAL CAP FOR EXPANSION JOINT FILLER TO BE PLACED HERE AND REMOVED BEFORE EDGING
EDGED ½" RAD.
NOT MORE THAN ½"
PAVEMENT THICKNESS
DOWEL BAR
DOWEL BAR CAP
SUBGRADE

SECTION SHOWING FIBRE TRANSVERSE EXPANSION JOINT

NOTE:- ALL FIBRE EXPANSION JOINTS SHALL CONFORM TO AASHO SPEC. M-59-42

NOTE:- TONGUE & GROOVE JOINTS FOR LONGITUDINAL & CONTRACTION JOINTS SHALL BE ASPHALT MASTIC BOARD AS MANUFACTURED BY KEYSTONE ASPHALT PRODUCTS CO. OR EQUAL AS APPROVED (STEEL CENTER STRIP MAY BE MENTIONED IN SPECS. IF ENGINEERING AUTHORITY DEEMS NECESSARY



CAP FOR ALL JOINTS
#12 GA. STEEL

PLAN OF PAVEMENT SHOWING JOINT LAYOUT
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KEYSTONE FIBRE EXPANSION JOINTS
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STAKE PINS FOR CENTER STRIP
INSTALLING CHANNELS FOR DUMMY JOINT
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A Division of American-Marietta Company
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Atlas Duraplastic cement was first used for paving in 1939. Each succeeding year has shown an increase both in the number and types of installations and in the number of engineers and contractors who have used this air-entraining portland cement—originated and developed by Universal Atlas.

Today these installations total 2½ million sq. yds. All of them are highly scale-resistant. Moreover, they have shown that Duraplastic cement minimizes segregation and bleeding, and makes a more workable, more cohesive, more durable concrete that dumps, spreads, screeds and finishes more easily.

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HIGHWAYS

Illinois—Chicago—Archer Ave.—1941—Illinois Division of Highways—Contractor, John A. McGarry Co.

Illinois—Chicago—Pulaski Road—1943—Illinois Division of Highways—Contractor, Ready Coal & Construction Co.

Michigan—Muskegon— 1943-44 — Michigan State Highway Department — Contractor, Vinton Construction Co.

Minnesota—Nicollet County—Trunk Highway #14—1940— Minnesota State Highway Department—Contractor, Okes Construction Co.

Minnesota—Marshall County—Trunk Highway #25—1941— Minnesota State Highway Department—Contractor, Okes Construction Co.

Minnesota—Todd County — Trunk Highway #10—1941—Minnesota State Highway Department—Contractor, Western Contracting Corp.

New York—Rhinecliff—State Highway RC 4016—1939—Department of Public Works—Contractor, John Arborio, Inc.

NewYork—Valley Falls—State Highway FA-RC 40-16,—1940—Department of Public Works—Contractor, Fitzgerald Bros. Construction Co., Inc.

Ohio—Akron—Access Road 991—1943—Ohio State Highway Department—Contractor, Thorpe Construction Co.

Ohio—Cleveland—Bulkey Blvd. Grade Separation—1943—Ohio State Highway Department—Contractor, National Engineering & Contracting Co.

Ohio—Columbiana County—State Highway Route165—1943—Ohio State Highway Department—Contractor, G. B. & C. H. Patterson.

Ohio—Allen County- -Federal Aid Projects DA-WI-9A, 9B and 24A—1943—Ohio State Highway Department—Contractor, Churchill Bros. Co.

Ohio—Lorain County—State Highway Route 611, Section A—1943—Ohio State Highway Department—Contractor, Dandrea, Nardini & Falbo.

Ohio—Huron County—State Highway Route18—1943—Ohio State Highway Department—Contractor, A. J. Baltes, Inc.

Ohio—Lorain and Medina Counties—State Highway Route 18—1943—Ohio State Highway Department—Contractor, A. J. Baltes, Inc.

Ohio—Portage County—State Highway Route 5—1943—Ohio State Highway Department—Contractor, W. M. Brode Company.

Ohio—Van Wert County—State Highway Route 418—1943—Ohio State Highway Department—Contractro: J. A' Ross & Co.

Ohio—Columbiana County—State Highway Route 14—1943—Ohio State Highway Department—Contractor. Frantz Bros.

STREETS

Akron, Ohio—Market St.—1943—City of Akron—Contractor, Thorpe Construction Co.

Appleton, Wisc.—Lawrence St.—1940—City Engineer—Contractor, Holz & Bass.

Chicago, Ill.—76th St.—1943—Chicago Department of Public Works & Buildings—Contractor, Calumet Coal Co.

Chicago, Ill.—S. Union Ave.—1943—Chicago Department of Public Works & Buildings—Contractor, Chatham Paving Co.

Lorain, Ohio—W. 21st St.—1943—City of Lorain—Contractor, Dandrea & Falbo.

Milwaukee, Wisc.—N. 45th St.—1939—Superintendent Streets, Construction & Repairs—Contractor, Bodeman Construction Co.

Milwaukee, Wisc.—Blue Mound Road—1939—Superintendent Streets, Construction & Repairs—Contractor, Bodeman Construction Co.

Minneapolis, Minn.—2nd Ave. N.—1939—City of Minneapolis—City forces.

Minneapolis, Minn.—E. Franklin Ave.—1939—City of Minneapolis—City forces.

St. Louis, Mo.—17th St.—1943—City Engineer—Contractor, Eyermann Contracting Co.

St. Louis, Mo.—Subdivision development—1943—Contractor, Guy Curry.

South Bend, Ind.—Pleasant St.—1939—City Engineer—WPA labor.

AIRPORTS

Douglas Aircraft Corp.—Park Ridge, Ill.—1942-43—U. S. Engineers—Contractor, Standard Paving Co., White Consolidated Inc., Thomas McQueen Co.

Grenier Field—Manchester, N. H.—1942-43—U. S. Engineers—Contractor, Central Construction Co.

Hills Grove Airport—Hills Grove, R. I.—1943—U. S. Engineers—Contractor, Louis A. Byrne.

Howard Aircraft Corp.—St. Charles, Ill.—1943—U. S. Navy—Contractor, Standard Paving Co.

Lambert Field—St. Louis, Mo.—1943—U. S. Engineers—Contractor, Israel Bros.

Rome Air Base—Rome, N. Y.—1941-43—U. S. Engineers—Contractors, Turner Construction Co., Louis Mayersohn, Peckham Road Corp., Clinton Asphalt Co.

Stewart Field—Newburgh, N. Y.—1942-44—U. S. Engineers—Contractors, D. & F. Construction Co., John Arborio, Inc., L. G. DeFelice & Son, Inc.

Stewart Field—Aux. #1—Montgomery, N. Y.—1943—U. S. Engineers—Contractor, John Arborio, Inc.

Stewart Field—Aux .#3—Hackensack, N. Y.—1943—U. S. Engineers—Contractor, L. G. DeFelice & Son, Inc.

Syracuse Air Base—Syracuse, N. Y.—1942—U. S. Engineers—Contractor, Elmhurst Contracting Corp.

STREETCAR AND RAILROAD TRACK PAVING

Ingram, Pa.—1943—Pittsburgh Rys. Co.—Own forces.

Johnstown, Pa.—1943—Johnstown Traction Co.—Own forces.

Minneapolis, Minn.—Riverside Ave.—1939 and '41—Twin City Rapid Transit Co.—Own forces.

Minneapolis, Minn.—Chicago Ave.—1942—Twin City Rapid Transit Co.—Own forces.

Pittsburgh, Pa.—Fleming Ave.—1943—Pittsburgh Rys. Co.—Own forces.

St. Paul, Minn.—Randolph St.—1942—Twin City Rapid Transit Co.—Own forces.

South Bend, Ind.—SS & SBRR—1941—SS & SBRR—Own forces.

MISCELLANEOUS

Parking area—Sears Roebuck & Co.—Chicago, Ill.—1943—Contractor, Allied Construction & Supply Co.

Parking area—Municipal Airport—Chicago, Ill.—1943—United Air Lines—Contractor, Ready Coal & Construction Co.

Riverbank paving—Johnstown, Pa.—Unit #6 Channel Improvement—1943—U. S. Engineers—Contractor, Wm. O'Neil Sons Co., Inc.

Drive and parking lot—Erie Coach Co.—Erie, Pa.—1943—Erie Coach Co.—Contractor, John Heubel, Sr.

Access roads—Goodyear Aircraft Corp.—Akron, Ohio—1943—Goodyear Aircraft Corp.—Contractor, Thorpe Construction Co.

Drives, streets and walks—Central Park Homes—Cleveland, Ohio—1943—U. S. War Housing Project—Contractor, Shaker Construction Co.

Curb, gutter and alley paving—Minneapolis, Minn.—1940-43—City of Minneapolis—City forces.

ATLAS DURAPLASTIC CEMENT

A Universal Atlas Product

CM-D-8

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Heil Hi-Speed CABLE SCRAPERS

. . . give you faster digging . . . faster hauling . . . faster dumping

Heil Hi-Speed Bottom Dump Wagon carries 12 yard load at 27 M. P. H.

This job-tested unit saves loading time, cuts hauling time, and speeds dumping. You can turn short and fast — and features such as high clearance, self-cleaning doors, lots of power, big tires, and scientific weight distribution for maximum traction mean greatly reduced "weather" delay. The Hi-Speed Tractor can be used interchangeably with the Hi-Speed Cable Scoop to give you alternate pieces of equipment to speed dirt-moving jobs.

You can move more yardage faster and at less cost by taking advantage of the three main features of famous Heil Hi-Speed Cable Scrapers:

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❸ At the fill, this unit spreads the load with a positive mechanical push-out action attained by tilting the floor. This fast, positive discharge is accomplished by a leverage action which exerts a *low line pull* on the unloading cable. The cutting blade remains in a fixed position in relation to the sides of the bowl and does not tilt with the dumping floor. Thus the load can be dumped at any desired height, and at travel speeds permitted by the grade.

Ask your Heil distributor for the complete story of why Heil Hi-Speed Cable Scoops give you fast, profitable dirtmoving at low cost per yard.

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"SPEED" will be the order of the day in postwar construction. That's why you can't take wire rope for granted!...why you can't depend on "just as good" rope for shovels or cranes or draglines.

And that's why you need *tough* Roebling "Blue Center" Wire Rope for *tough*, excavating and construction jobs! Its proven stamina to deliver long service ...its engineering—both in our plant and on your job —assures economical operation by reducing costly shutdowns and expensive maintenance practices.

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And find out, too, how Roebling engineers can help you choose the *right* rope for *every* operation. A telephone call to our nearest branch office is the first step toward greater returns from your rope-rigged equipment. Why not make it today?

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Q Why are three or more seizings recommended to hold the end of a rope when one would keep it from unraveling?

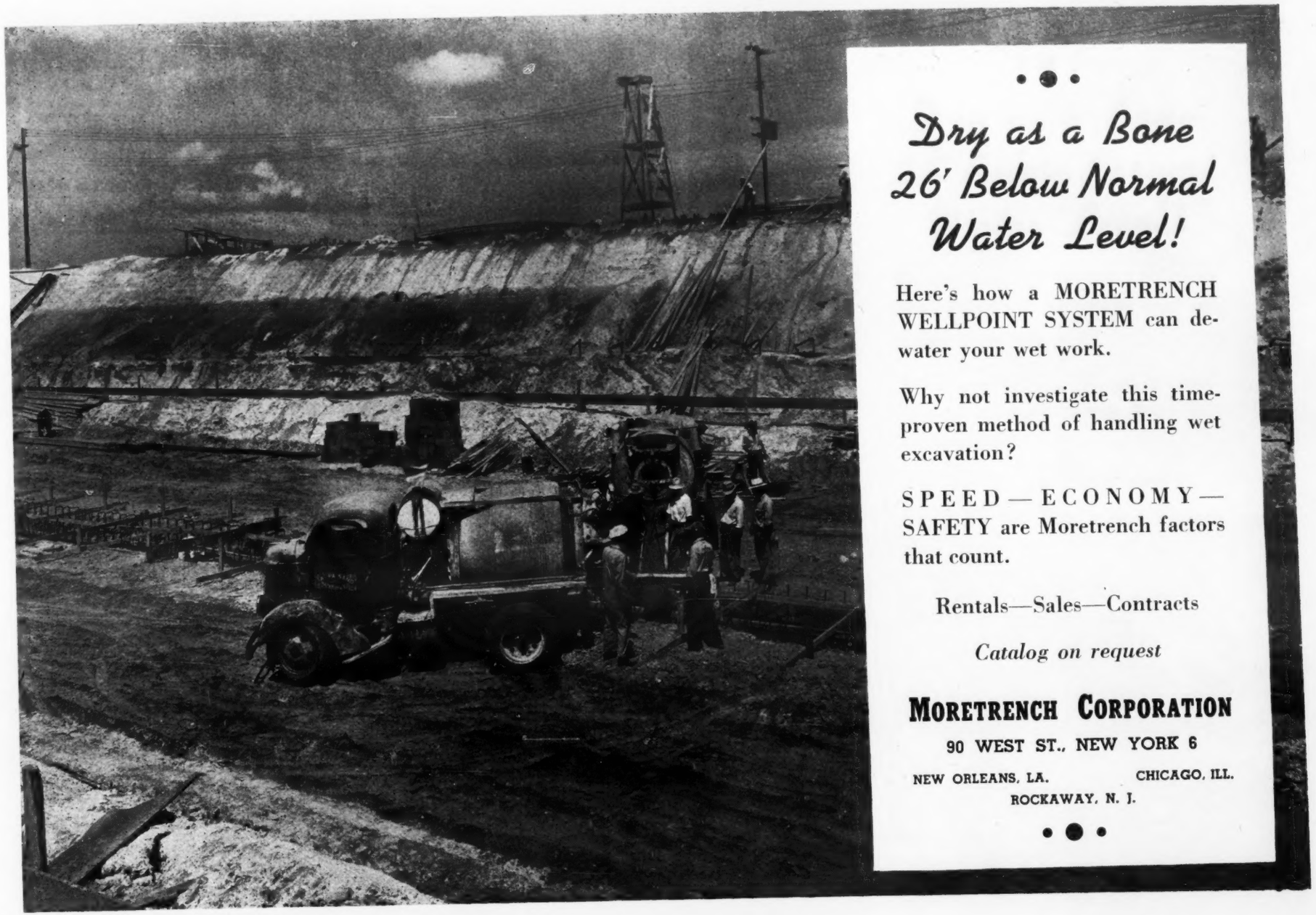
A *With non-preformed rope it is almost impossible to hold the strands sufficiently tight with one seizing. If rope lay is lost or if any of the strands is allowed to shift from its balanced relation with respect to the others, improper rope life will very likely result.*

Q Is it necessary to use seizings on a preformed rope?

A *It is not necessary to use seizings to keep preformed rope from unlaying because all wires and strands are set to their helical forms. However, it is advisable to use seizings to prevent the strands from being forcibly unlaid and distorted when cutting or handling the rope. Naturally, preformed rope must be seized when preparing it for socketing.*

Q Is it wrong to stagger the clips on a thimble and clip attachment?

A *Yes. The live end of the rope should be protected against crushing and abuse by placing the body of all clips against this side. All U-bolts should be on the short, or dead end of the rope.*



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Here's how a MORETRENCH WELLPOINT SYSTEM can dewater your wet work.

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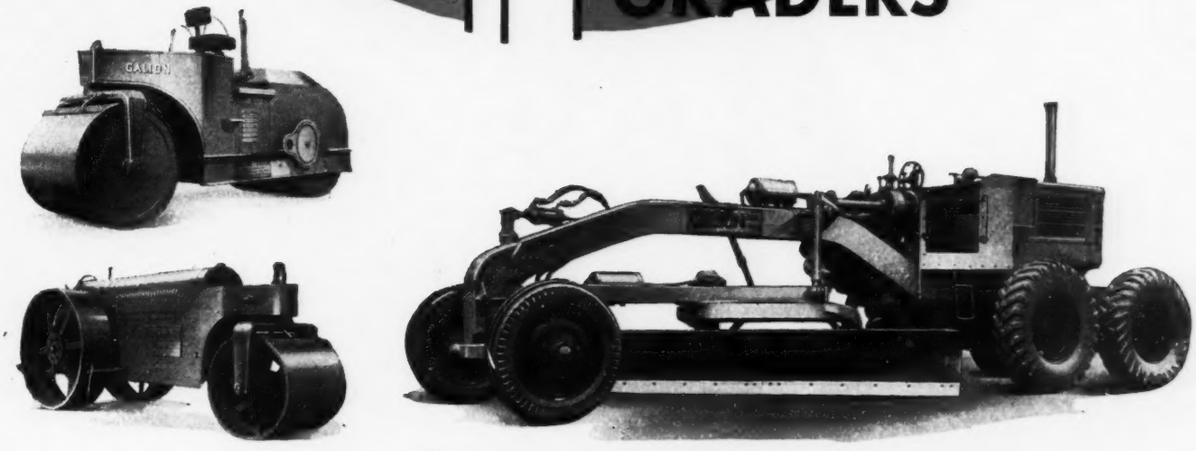

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Stop that thieving demon *RUST* with new

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WHAT IS RUST'S annual "cut" in your business? How much should you charge off to this thievery?

Probably much more than you think!

Because the cost of rust is the total of a lot of big and little losses. Depreciating equipment . . . ruined materials . . . worthless finished products. *Plus time wasted all along the line!*

That is no new story. *The news is that Shell has perfected and now presents a complete line of Rust Preventives* . . . the new Shell Ensis Rust Preventives for coating metals . . . the new Shell Tellus Oils for lubrication.

Shell Ensis Rust Preventives embody a complete line of oils, fluids and compounds. They are available in various grades and provide protection against the dangers of exposure. Their protective coatings range from thin, transparent films for indoor use to heavy, abrasion-and-weather-resistant coatings for outdoors.

Shell Tellus Oils do not *remove* rust . . . However, where moisture is a factor, special rust-inhibiting qualities built into them afford protection against the formation of rust, without sacrifice of other valuable characteristics.

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SHELL Ensis Rust Preventive Coatings

SHELL Tellus Rust Preventive Lubricating Oils

SHELL

These two Universal Crushing Plants are supplying crushed rock for the Rock County, Wisconsin airport (Class IV) near Janesville, Wisc. Plant at left, owned by Art Overgaard, Elroy, Wis., consists of 546-P primary unit with 20″ x 36″ jaw crusher and secondary unit with 30″ x 18″ crushing rolls, double deck screen, rotovator and conveyors. Plant below owned by Rock Road Construction Company, Chicago, consists of two complete plants in tandem—one with 10″ x 36″ jaw crusher, double deck screen and conveyors and one with 40″ x 22″ crushing rolls and 2¾ deck screen, rotavator and swivel conveyor. Over 200 yds. per hr. of 1″ material are produced.

How Much Crushed Rock for 10,000 Airports?

We could tell you to the yard, if we knew the size of each and the specifications. We could also tell you which of the more than 50 Universal Portable Crushing, Screening and Loading Plants would turn out the crushed rock or gravel faster to specification and at the lowest cost per yard. Ten thousand is a lot of airports, but it would not take Universal plants very long to pile up the material needed for them. Scores of Universals are now providing landing field materials for the South Pacific Islands retaken from the Japs. There'll be a lot of airports built after the war — how many, we're not sure — but, if you figure on furnishing the crushed rock for any of them, why not check with your Universal dealer? He may have some helpful suggestions.

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CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS

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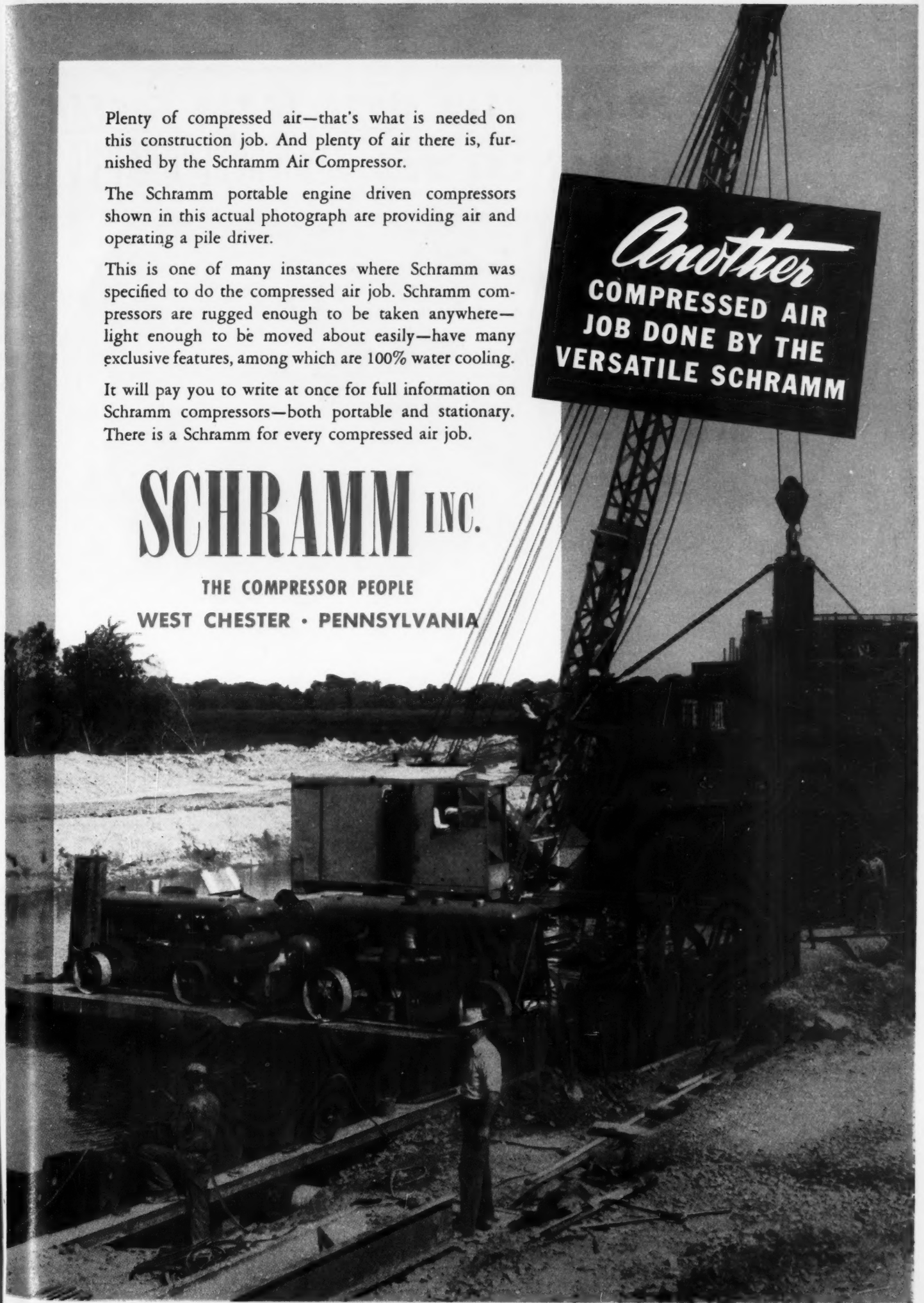

Plenty of compressed air—that's what is needed on this construction job. And plenty of air there is, furnished by the Schramm Air Compressor.

The Schramm portable engine driven compressors shown in this actual photograph are providing air and operating a pile driver.

This is one of many instances where Schramm was specified to do the compressed air job. Schramm compressors are rugged enough to be taken anywhere—light enough to be moved about easily—have many exclusive features, among which are 100% water cooling.

It will pay you to write at once for full information on Schramm compressors—both portable and stationary. There is a Schramm for every compressed air job.

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Features that Spell PERFORMANCE

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- ★ *Air Operated Cable Hoist*
- ★ *Powerful Air Brakes*

Universal oscillating King Pin permits either or both units to tilt in opposite planes while the engine unit freely turns to right or left.

HIGHSPEED EARTHMOVING ON LONG OR SHORT HAULS

The new Wooldridge self-propelled *TERRA-COBRA* Earthmover embodies many exclusive and patented features, not to be found in any similar type of equipment. Positive *2-wheel* hydraulic steering control permits higher travel speeds, especially on narrow causeways and over soft or rough ground. Universal oscillating pivot-coupling permits greater flexibility of travel over rocks, ruts and uneven surfaces. Braking power is applied by powerful air brakes, where it should be... on the rear of the scraper and equally on both wheels at exactly the same time. Heavy fast moving loads can be slowed down or quickly stopped in a short distance with the operator always in full control. Smooth air-operated cable hoist instantly responds to the touch of a finger maintaining constant and uniformly even pressure on cables at all times thereby avoiding "jerky" starts or stops. Terra-Cobras load quickly and spread fast without slackening their pace. Surplus rim pull permits operator to reach top speed in a hurry as well as to climb comparatively steep slopes, fully loaded, without the help of a "pusher." For extra yardage profits on long and shorter hauls, investigate fully today.

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SPEEDS UP TO 21 M.P.H.

The new Terra-Cobra operating on four speeds forward rapidly accelerates to speeds up to 21 M. P. H. in a short distance. In reverse gear the Terra-Cobra operates at a maximum speed of 3.2 M. P. H. and 13,000 lbs. rim pull.

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Powerful heavy duty 150 H. P. diesel engine propels the Terra-Cobra. Special mounting of engine in chassis facilitates rapid servicing or removal.

POSITIVE TWO-WHEEL STEERING ELIMINATES "JACKNIFING"

In the Terra-Cobra there are no steering clutches to "fight"—nor individual brakes to "humor" or grab. Steering is controlled by simply turning a steering bar. The front drive wheels turn together, under power. Regardless of speed, load or condition of ground surface the Terra-Cobra maintains a fixed direction of travel under the complete and effortless control of the operator. As there is never any possibility of *"jacknifing"* there's no need to slacken speed when traveling, spreading, turning or passing.

Get the full story on the new Wooldridge TERRA-COBRA. See how it will further speed-up your earthmoving operations and vastly increase safety.

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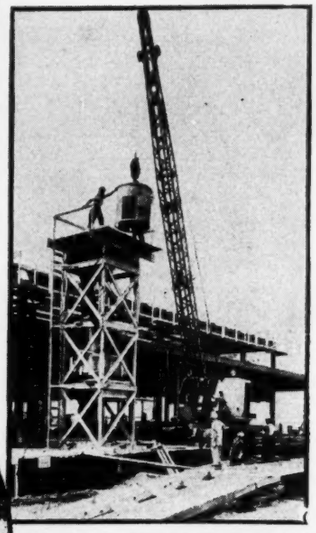
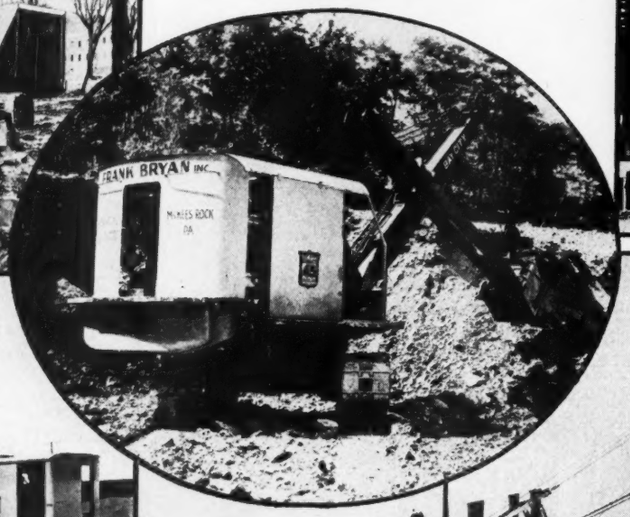
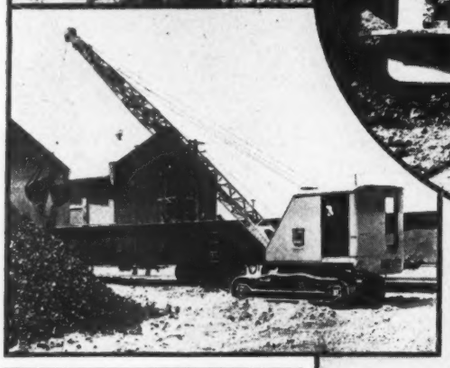
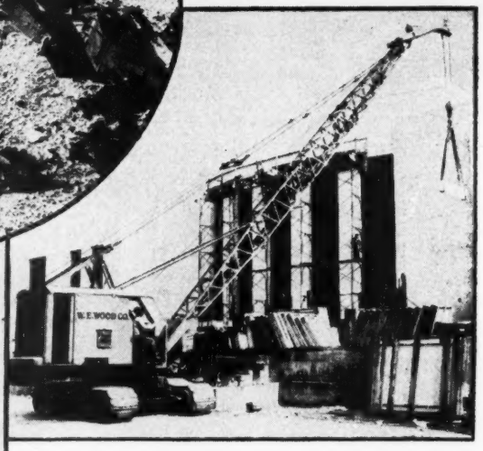
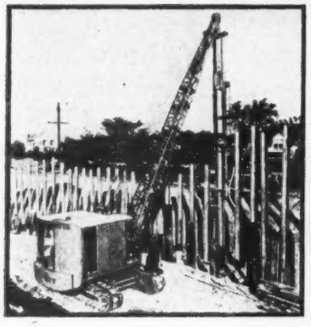
—a page of job photos showing typical application of BAY CITY 3/4 yard shovel—10 ton crane











Photos show typical convertibility of BAY CITY machines making it readily possible to adapt them to many different construction jobs. Other sizes from 3/8 to 1¼ yards. Crane rating up to 20 ton capacity. Both crawler and pneumatic-tire mounting. While current production is required by military needs, we would like you to become better acquainted with these fast, powerful, easy operating machines. Just write BAY CITY SHOVELS, Inc., Bay City, Mich. for catalogs.

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12 Sizes
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Also truck mounted shovels and cranes

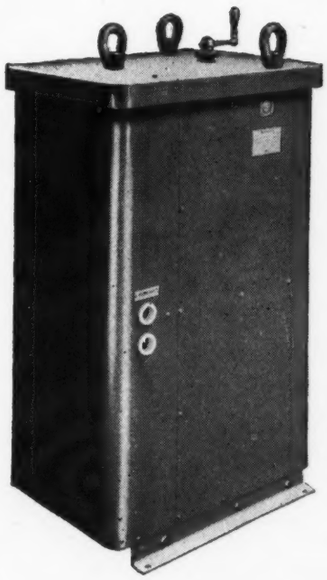
BAY CITY

SHOVELS • CRANES • DRAGLINES • TRENCH-HOES • SKIMMERS

"A-C transformer-type welders? I'd buy 'em from TRANSFORMER HEADQUARTERS!"

"Who do you mean, Steve?"

"Why, Westinghouse, of course. Any a-c welder is built around a transformer, and Westinghouse has been building all types of transformers longer than anybody else—so I'd suggest we get 'em from the outfit that's recognized as transformer headquarters."



A-c welders are essentially transformers. That's why Westinghouse A-C Welders offer the benefit of more years of experience in the designing and building of this type of equipment than any other welder . . . because Westinghouse built the first successful commercial transformers.

A-c electrodes, too, have been developed, tested and proved by Westinghouse to meet welding requirements that range from the lightest welding to the heaviest. In fact, Westinghouse A-C Welders and Electrodes provide the right combination for faster, more economical industrial welding—maintenance, fabrication or construction.

Westinghouse A-C Welders are available in a complete range of ratings from 100 to 2000 amperes. Ask for catalog B-3136 giving full details. Westinghouse Electric & Manufacturing Co., Box 868, Pittsburgh 30, Pa.

J-21315

Westinghouse

A-C WELDERS and ELECTRODES

Lay-Set is pre-f

● When you put Hazard **LAY-SET** **PREFORMED** on your machine, you install a wire rope that is ready to start work. You don't have to "baby" it. The preforming process sets each wire and strand at complete ease and relaxes the steel. That's why **LAY-SET** can work hard from the word GO! More than this, **LAY-SET** **PREFORMED** is easier and faster to install and safer to handle. It lasts longer, therefore gives greater dollar-value.

●

HAZARD WIRE ROPE DIVISION

WILKES-BARRE, PA.
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CHICAGO
DENVER
FORT WORTH
LOS ANGELES
NEW YORK
PHILADELPHIA
PITTSBURGH
PORTLAND
SAN FRANCISCO
TACOMA

AMERICAN CHAIN & CABLE
BRIDGEPORT

HAZARD LAY-SET Pref

RECORDS EFFECT SAVINGS IN TIME, MONEY and ACCIDENTS

W. H. (Bill) Brokaw Tells How Record-keeping Pays

"Safety is a full-time job," I once read somewhere and I agree. But I'd like to add that no matter how much time a machine operator spends on a safety campaign, he needs a few of the right sort of reminders now and then.

"Not long ago I was on a rush job at an Army air base. We were trying to meet a deadline and didn't wait for wire rope replacements which were on the way. We used about 3,000 feet of wire rope on the job, of the ordinary type and most of it rope which had already been retired. As a result, seven or eight cases of infection developed from snagged hands, and one break resulted in a leg injury. Since most of the men were in the habit of working with preformed rope which didn't snag, they were too late in learning how to handle the old rope to avoid injury.

"An honest estimate of the time lost because of the accidents which could have been avoided by waiting for the new preformed cable would be far greater than the hours of lay-up, had we stopped and waited for deliveries.

Reminder System

"I have a system which will not allow me to forget things like that. I keep a daily diary, in which I record all operation faults. But that's not all. Once a week I go over my record and check such cases and study them. And when I have the chance I discuss with others how they could have been avoided.

"Some operators tell me that they can remember all they want to remember about accidents. But I can't. Unless I study my record and look for better methods whereby I can correct my errors, I find that I soon forget about all but the 'slick' jobs where there were no accidents or faults. The lesson I should have learned is gone, and with it the picture of what happened and what could be done another time to avoid a 'repeat'."

Safe SNOW Runways

WITH THE SEAMAN PULVI MIXER

Developed In Alaska: Using the SEAMAN PULVI-MIXER to pulverize and level snow to aid in compaction for high load bearing, low cost snow runways.

Turn the first heavy snowfall to your airfield's advantage! And with every successive snow,—cross out the word "removal" from your maintenance dictionary and substitute "utilization" instead. For, with the SEAMAN PULVI-MIXER, snow is utilized, to make firm, hard, smooth and level runways,—without creating dangerous, adjacent snowbanks. Pulverize the snow first with the SEAMAN. Keep the hood closed, of course, to effect complete pulverization of lumps and hard spots and to assure a level path. Then bring on your roller compaction equipment. If after sufficient rolling, a few high spots remain,—grind 'em down with the SEAMAN,—this time with the hood open to disperse loose material over a wide area.

MODEL MHD 72

C-101

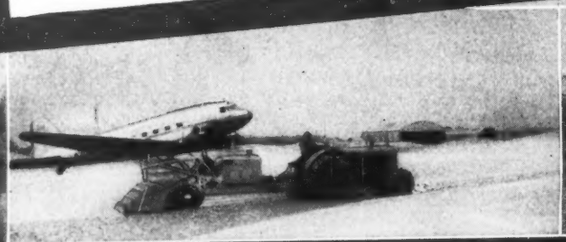
SEAMAN PULVI MIXER

Every Road Mix Job Needs A Seaman

And remember, the SEAMAN is unique in removing ice and hard-packed drifts from runways and highways. Because a compensating device permits the new "shock-cushioned" tines to stop momentarily when impact approaches a damaging force, ice is shattered without damage to pavement or tines.

A tip to contractors: Keep your SEAMAN busy through otherwise idle winter months. Contract to keep nearby airfields in shape. Let the airfield management make the choice: snowplows plus the SEAMAN for keeping runways free of ice and hard, frozen drifts,—or snow compacted runways with the SEAMAN in the stellar role.

PIONEERED by Seaman



The SEAMAN MIXER loosening and pulverizing snow prior to compaction

Removing ice from airport runways with the SEAMAN MIXER

"Worth a million," they say. SOIL STABILIZATION METHODS compiled by SEAMAN engineers is yours without charge. Ask for Bulletin C-24

SEAMAN MOTORS
MILWAUKEE 3, WISCONSIN

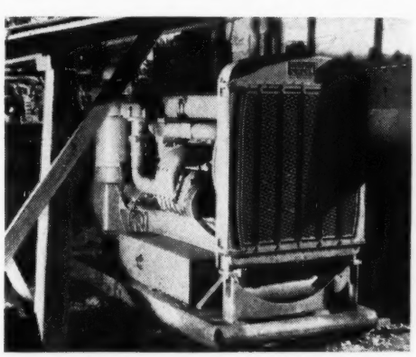
SUPERCHARGING made this power Portable

PRODUCING 125 tons of hot-mix an hour, for resurfacing Highway 10, near Frenchtown, Mont., this asphalt plant required more power than an ordinary portable generator could supply.

Today this plant is operating on a single-unit, self-contained Murphy Diesel Generating Set, supercharged by B-W. Weighing only approximately 9,000 pounds, the unit supplies 106 Kilowatts and is easily manageable on a heavy truck.

To provide more power in a given space or weight . . . or to compensate for loss of power at higher altitudes . . . and with little appreciable increase in weight — B-W Supercharging finds many uses in engines for the marine, industrial, transportation, and automotive fields.

This Murphy Diesel Generating Set, supercharged by B-W, is producing 106 kilowatts. The actual size of the unit is only 11 feet long, 40 inches wide, and 5 feet 6 inches high.

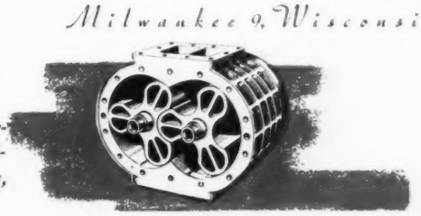


ENGINEERING B-W PRODUCTION

SUPERCHARGERS, INC.

● DIVISION OF BORG-WARNER

Milwaukee 9, Wisconsin



B-W Superchargers are precision-built for the most efficient operation and long, trouble-free service.

SWINGING "Antietam" INTO POSITION

IN PERFECT coordination, two giant 75-ton capacity cranes slowly swing into position the 105-ton after-section of the flight deck island on the new aircraft carrier "Antietam"—an operation that requires maximum teamwork from crane operators and maximum efficiency from wire rope.

To get the most efficient service out of wire rope—on projects large and small—it must be thoroughly protected from the destructive effects of wear and weather. And to experienced contractors everywhere, this means lubrication with *Texaco Crater.*

Texaco Crater penetrates into and preserves the core of wire rope, preventing collapse. It seals each wire in a tough viscous film that reduces internal friction and wear, keeps out moisture, prevents corrosion. Keeps rope strong longer.

Used on open gears, *Texaco Crater* cushions load shocks, quiets noise, reduces wear. It doesn't ball up, channel or throw off, but clings to tooth surfaces, following through from gear to gear, despite high pressures and tempera tures, and peripheral speeds.

Texaco lubricants have proved so effective in servic they are definitely preferred in many fields, a few of whic are listed below.

Texaco Lubrication Engineering Service is available t you through more than 2300 Texaco distributing point in the 48 States. The Texas Company, 135 East 42n Street, New York 17, N. Y.

THEY PREFER TEXACO

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

★ More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.

★ More revenue airline miles the U. S. are flown with Texac than with any other brand.

★ More buses, more bus lines a more bus-miles are lubricated wi Texaco than with any other bran

★ More stationary Diesel hors power in the U. S. is lubricated wi Texaco than with any other bran

TEXACO

TUNE IN THE TEXACO STAR THEATRE WITH JAMES MELTON SUNDAY NI

Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

METROPOLITAN OPERA BROADCASTS SATURDAY AFTERNOONS

This is a Telsmith Portable Crushing Plant being operated by the Seabees on Guadalcanal. The two gas-drum halves at the top of the elevator form an ingenious rig devised by Seabee Sanborn (at extreme left) to keep the propeller wash of warming up aircraft from blowing away the crushed material, discharged by the elevator.

TELSMITH
with the Seabees
ON GUADALCANAL

"Every rock is a sock at Tojo"—that was the motto of the crusher crew of the 14th U. S. Navy Construction Battalion — working-fighting Seabee veterans of Guadalcanal and winners of the Presidential Citation. Part of that "outfit" is pictured above in action on Guadalcanal in 1943—making full-speed-ahead with their 10" x 21" Telsmith Portable Crushing Plant, crushing rock to maintain an air field.

Standing at the extreme left is C. A. Sanborn, Machinist's Mate First Class. Like many Seabees, he had previous civilian rock-crushing experience. He held an executive position with the Lehigh Stone Company, which has offices at Kankakee, and quarries at Lehigh, Illinois.

In all parts of the world the Seabees and Telsmith portable, semi-portable, and large scale aggregate production plants are carrying on, helping to bring V-day closer. Telsmith peacetime portables will have large capacity with lowest operating costs—*get Bulletin P-10.*

P-10

SMITH ENGINEERING WORKS, 510 E. CAPITOL DRIVE, MILWAUKEE 12, WISCONSIN

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713 Commercial Trust Bldg. Philadelphia 2, Pa.
247 Third Street Cambridge 42, Mass.
Boehck Eqpt. Co. Milwaukee 3, Wis.
Mines Eng. & Eqpt. Co. San Francisco 4—Los Angeles 14
Brandeis M. & S. Co. Louisville 8, Ky.
Rish Equipment Co. Charleston 22, & Clarksburg, W. Va.
Rish Equipment Co. Roanoke 7, & Richmond 10, Va.
North Carolina Eqpt. Co. Raleigh and Charlotte 1, N.C.
Wilson-Weesner-Wilkinson Co. Knoxville 8, & Nashville 6, Tenn.

...Out of the Blue!

• A design takes shape . . . the fabricated steel moves out on time . . . accurate workmanship and close adherence to "specs" the keynote . . . another satisfied customer! For accomplishing the unusual in the usual way is a matter of routine at Levinson.

LS-1

The LEVINSON—
STEEL CO.

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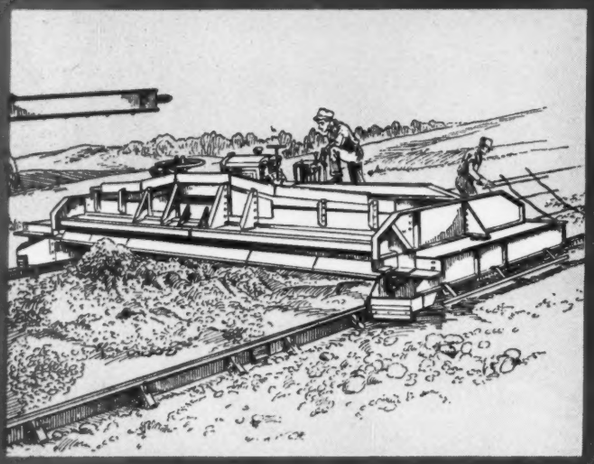
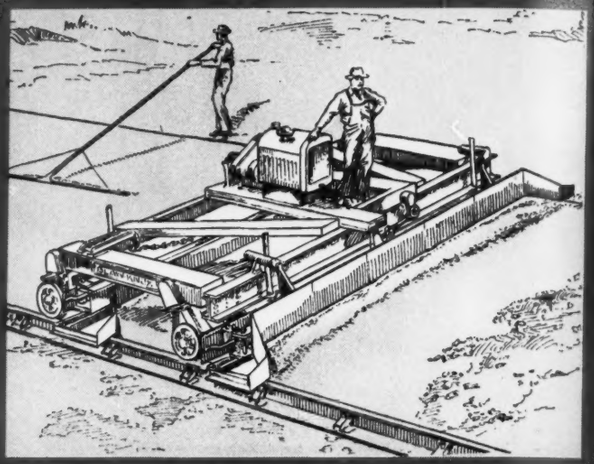
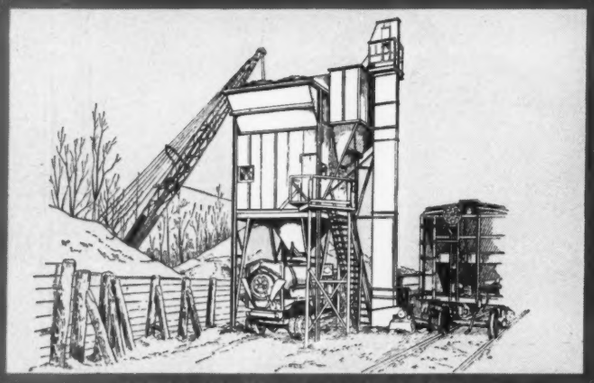
BLAW-KNOX HAS THE ANSWERS TO



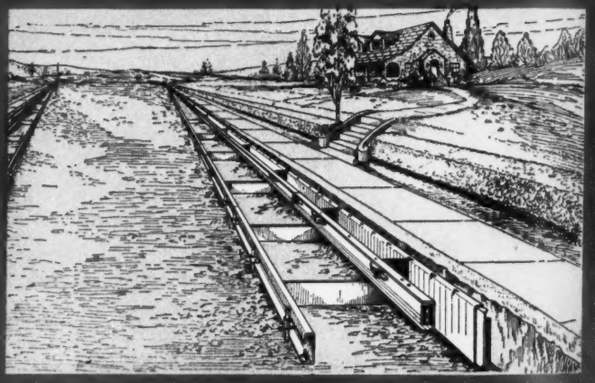
PAVING SPREADERS FOR ROADS AND AIRPORTS



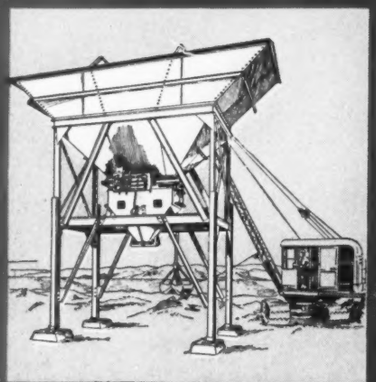
FINISHING MACHINES FOR ROADS AND AIRPORTS



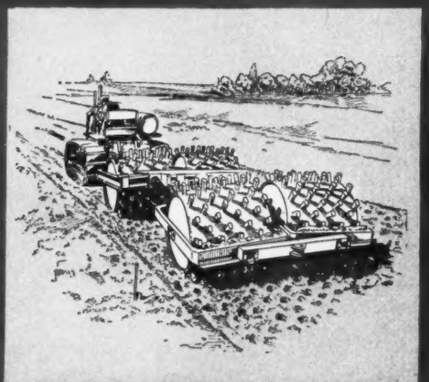
TRUCK MIXER LOADING PLANTS



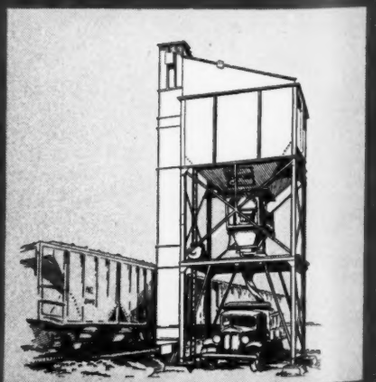
STEEL STREET FORMS



AGGREGATE BATCHING PLANTS

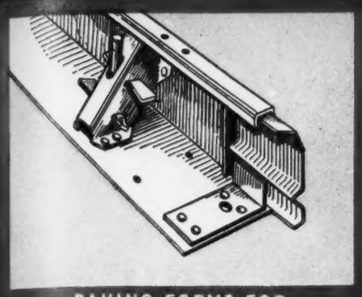


SHEEPSFOOT TAMPING ROLLERS

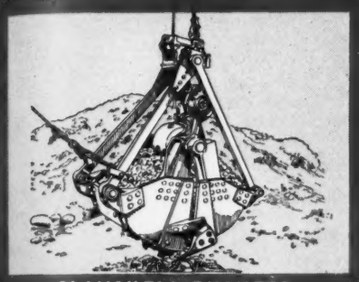


BULK CEMENT PLANTS

FASTER CONSTRUCTION



PAVING FORMS FOR ROADS AND AIRPORTS



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CONCRETE BUCKETS

Blaw-Knox Equipment is first choice of construction men who have a reputation for getting projects completed in a hurry and at lowest possible cost.

Modern and rugged design endows Blaw-Knox Construction Equipment with production capacities that were unheard of heretofore.

You'll find this trouble free equipment hard at work building roads, airports and general concrete construction all over the world.

Your nearest Blaw-Knox Distributor will handle your inquiry promptly and efficiently.

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WHEN THE INDUSTRIAL [illegible] RETURNS TO PEACE-TIME PRODUCTION

PUT *Gar Wood Service* TO WORK FOR YOU

We're in this war . . . right up to our ears. Gar Wood Industries, Inc. was among the first to convert ALL production into war work . . . and we'll keep producing more and more fighting equipment to back up our fighting men all over the world.

But we've an eye on the future, too. When Victory has been won and industry returns to normal peace-time production, Gar Wood will be prepared to serve customers and users better than ever before. Look to Gar Wood for the specialized equipment you want WHEN you want it. Branches and Distributors in all principal cities.

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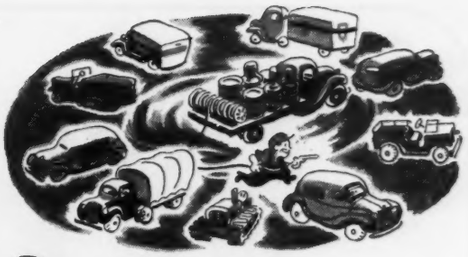
Three Ways "On the Job" Power Lubrication Can Lower Your Maintenance Costs

Q **Can "on the job" lubricating give machines "M. P. T."?***

A Yes! In one case, by reducing track roller wear one-third over previous methods, time-outs for repairs were cut more than 30% . . . 30% "M. P. T."* for the "cats." Another contractor lubricates track rollers in 2½ seconds adding "M. P. T."* to his machines. Do these examples show you how to speed up lubrication?

*More Productive Time

Alemite Portable Service Stations are complete power lubrication departments on wheels that carry lubricants to machines on the job. They include high- and low-pressure Alemite Barrel Pumps, Alemite Motor Oil dispenser, hose reels and gas engine air compressor. Write for new catalog.



Q **Are portable service stations just for lubrication?**

A No. They have many uses. For high pressure power lubrication of all bearings equipped with pressure gun fittings. This covers practically every type of machine. For rapid filling of gear housings, final drives, rear axles, transmissions and crank cases. For tire inflation, engine cleaning, paint spraying, etc. Versatile outfit, isn't it?

Q **Does "on-the-job" lubrication save on lubricants?**

A Definitely. Here's the experience of one organization: using the "barrel to bearing" application of lubricants from an Alemite Portable Service Station, a saving of 19% was made in the consumption of grease and oil. And every bearing and gear got clean, uncontaminated lubricants. Are you interested in a saving on lubricants?

Lick "LUBRI-*chaos*" with Controlled "On the Job" Power Lubrication.

"Lubri-*chaos*" can rob you of money, machines and production. Worst of all, you may have "Lubri-*chaos*" in your set-up and not realize it, or today's heavy work schedules may have spotlighted it but given you no answer.

The *answer* is the Alemite method of handling and application of lubricants to your machines right on the job. This method is now proving its worth on construction projects everywhere. It's called the Alemite Portable Service Station and is destined to play an important role in peacetime competition.

Why not call in an Alemite Lubrication Specialist and talk over your lubrication situation. There is no obligation and you'll be gaining the advantage of the world's most modern lubricating methods. Write Alemite, 1840 Diversey Parkway, Chicago 14, Illinois, or Belleville, Ontario.

Another Product of STEWART WARNER

ALEMITE

First in Modern Lubrication

CONSULTATION • ENGINEERING • EQUIPMENT • LUBRICANTS • MAINTENANCE

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Do You Get

Real Help in Meeting

Contract Deadlines?

BUY OIL—

Investigate this Complete Lubrication Service—

SOCONY-VACUUM'S practical aid to contractors goes far beyond mere lubrication of equipment. *It's the kind that helps save man-hours on the job—speeds contract completion!*

First of all, you get fine products—a complete quality line backed by 79 years of refining experience. Whether you operate 6 or 60 pieces of equipment, we can satisfy all of your fuel and lubrication requirements. *And we meet those requirements right out on the job!*

We assign a Socony-Vacuum representative to work with you—make recommendations after careful study of your equipment and job problems. You get engineering aid—tested Socony-Vacuum maintenance schedules that help cut out-of-service time . . . keep machines operating at maximum efficiency and economy!

Take advantage of these proved time-saving methods. Call in Socony-Vacuum today!

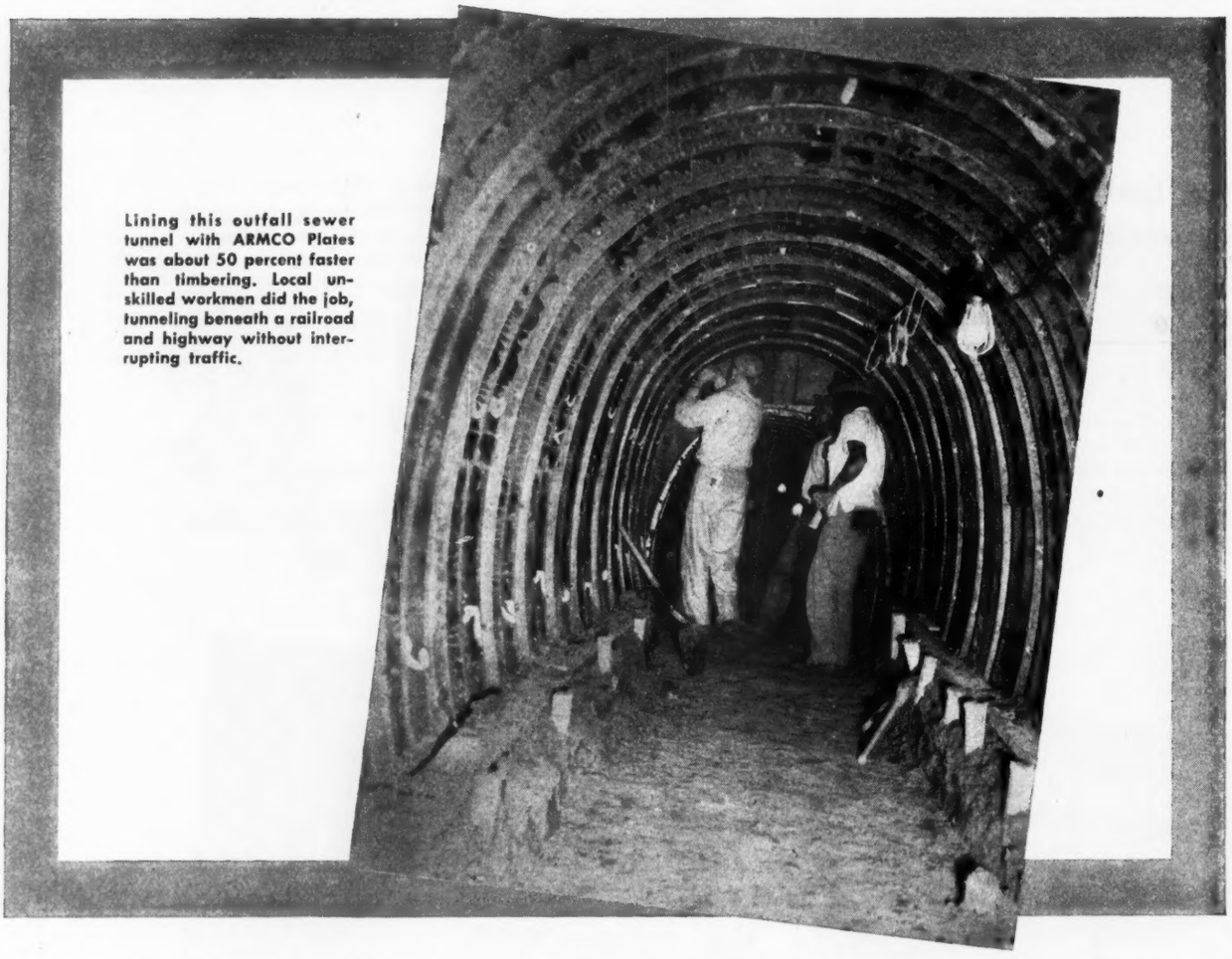
"ON YOUR STAFF — BUT NOT YOUR PAYROLL" — Your Socony-Vacuum Representative

SOCONY-VACUUM OIL CO., INC. and Affiliates:—
Magnolia Petroleum Co., General Petroleum Corp. of Calif.

CORRECT LUBRICATION FOR EVERY PART OF EVERY MACHINE YOU OPERATE . . .
PLUS
1 ENGINEERING HELP on time-losing operating problems; 2 TESTED MAINTENANCE SCHEDULES that minimize service man-hours—keep equipment on the job;
3 PROMPT, DEPENDABLE DELIVERY—a reliable, on-the-job service that eliminates inventory problems for you!

THESE STRONG, LIGHT PLATES

Speed Tunneling



Lining this outfall sewer tunnel with ARMCO Plates was about 50 percent faster than timbering. Local unskilled workmen did the job, tunneling beneath a railroad and highway without interrupting traffic.

Fast tunneling is no trick with ARMCO Liner Plates. Even inexperienced crews can install them quickly. One man easily handles the strong, lightweight steel sections, bolting them together with regular wrenches. Work moves fast and costs are low.

On a strength-weight basis, ARMCO Plates cost less than four-flange types. In many cases you actually buy fewer plates because their great strength permits the use of alternate rings in partly self-supporting ground. You save on another score too . . . There is a type and gage to meet every tunnel condition, and you can order your ARMCO Plates to fit the job. Excess weight is out—you buy sinewy strength, not bulky pounds.

Use ARMCO Liner Plates on your next tunnel. Other contractors and engineers find them a big help in "holing through" ahead of schedule and under the estimate. Write for complete facts. Armco Drainage Products Association, 25 Curtis St., Middletown, Ohio.

ARMCO

ARMCO TUNNEL LINER PLATES

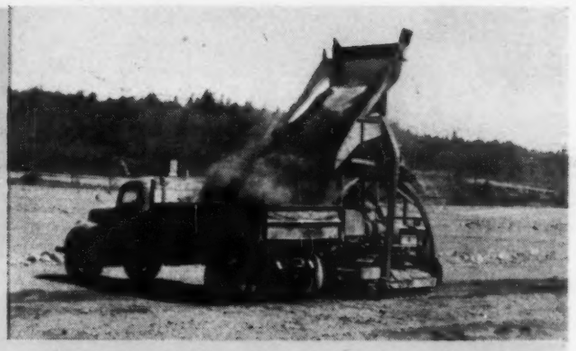
WHICH OF THESE MATERIALS DO YOU LOAD?

IF you load any of these materials — **GRAVEL EARTH • CRUSHED ROCK • SAND • ORE SNOW • COAL**—look into the many merits of Athey MobiLoaders.

These fast-working loading tools, mounted on "Caterpillar" Diesel Tractors, are turning in outstanding records of production and low costs. Using the overhead loading principle, they're moving all kinds of materials faster, boosting output on every loading job.

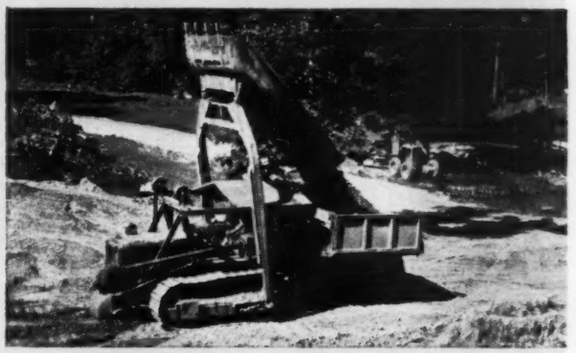
Ask your Athey "Caterpillar" Dealer about delivery on an Athey MobiLoader. In the meantime, write for new descriptive folders.

New, Picture Folders On Athey MobiLoaders
Write Athey Truss Wheel Company, 5631 West 65th Street, Chicago 38, Illinois for Folders 444 and 445.



Loading rock into trucks on the Tacoma and Seattle, Washington Airport, this Athey MobiLoader speeds loading jobs for the Northwest Construction Company.

Sub-grading and loading earth at the rate of 90 cubic yards per hour with Athey MobiLoader. Owned by Columbia Bitulithic, Ltd., Vancouver, B. C.



This versatile Athey MobiLoader is loading from a compacted gravel embankment in a county quarry near Paragould, Ark. Loading 4 yd trucks in less than 2 min.

Crushed rock is quickly handled by this big-capacity Athey Model 8 MobiLoader on railroad grade building near Shelton, Washington for General Construction Co.

Athey
MOBiLOADERS

YOU CAN DEPEND ON LA PLANT-CHOATE

"Know-How"

FOR THE BEST IN TRACTOR EQUIPMENT

When it comes to developing new and better tools for your post-war jobs remember—no other manufacturer in the tractor equipment field can match LaPlant-Choate's 33 years of pioneering leadership. This record is your best assurance of tomorrow's best buys in tractor equipment. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Ia.

1911—LaPlant-Choate started out as a partnership between E. W. LaPlant and Roy Choate—manufacturing horse-drawn stump pullers and house moving equipment.

1919—Introduced a line of trailers with solid disc steel wheels for hauling logs, heavy machinery, etc.

1922—Began manufacturing steel dump wagons with disc steel wheels for hauling dirt behind tractors.

1923—Developed the first tractor-mounted bulldozers to be manufactured on a commercial scale. Original models were hand operated and mounted on Holt and Best tractors, which preceeded "Caterpillar".

1924—Introduced a small two-wheeled hydraulic operated carrying scraper with disc steel wheels for operation in tandem behind tractors.

1925—Developed the first hydraulic operated bulldozers to be produced on a production basis. Also the first tractor-mounted snow plow with both the "V" and wings hydraulically controlled. Became the first company to build earthmoving and snow removal equipment for use exclusively with "Caterpillar" tractors.

1927—Business incorporated April 5, 1927. Introduced a dozer with an angling blade for side casting material.

1929—Introduced a dozer with a tilting blade. Also developed a small hydraulic operated roll-over scraper (Fresno type).

1934—Originated the first front mounted hydraulic pump for use with "Caterpillar" tractors in operating dozers, scrapers and snow plows.

1935-37—Pioneered the first hydraulic operated brushcutters, treedozers, rootcutters and weed eradicators for clearing waste land. Also began manufacturing two-wheeled hydraulic operated scrapers on rubber tires. Introduced the first positive forced ejection hydraulic scraper ever built.

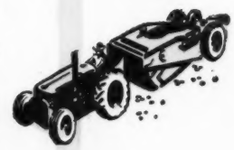
1938—Developed the first successful cable operated carrying scraper to utilize the principle of simultaneous operation of gate and apron in loading and unloading. Also introduced a line of cable operated dozers, rippers and sheepsfoot tamping rollers.

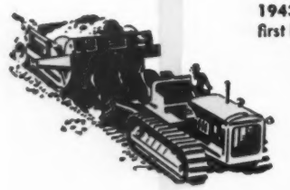
1940—Pioneered the first scraper to dig, carry, dump and spread by means of single valve and jack arrangement. Also developed the first practical inside frame dozer.

1941—Introduced the first hydraulic operated scrapers for use with "Caterpillar" high speed rubber tired tractors.

1942—Originated the first airborne bulldozers and scrapers to be flown in Army transport planes.

1943-44—Became the nation's largest producer of dozers for the armed forces; pioneered first Beach-Dozer and first Tank-Dozer, in cooperation with U. S. Army Engineers and Ordnance.

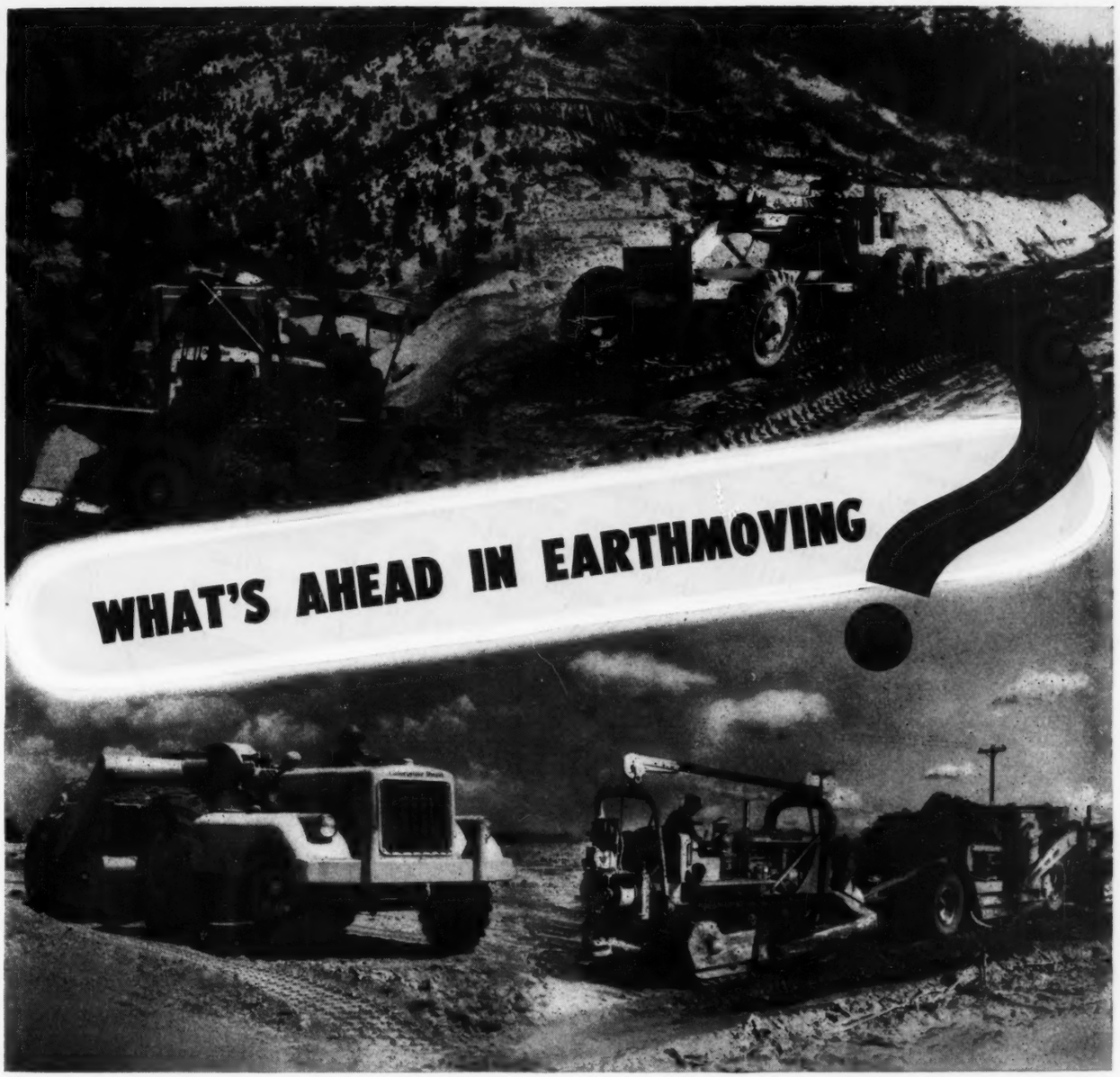




NOTE: LaPlant-Choate now controls over 120 patents and applications covering both hydraulic and cable operated tractor equipment.

LA PLANT-CHOATE

Earthmoving and Land Clearing Equipment



EARTHMOVERS are going to be busy. You are getting ready now for the big jobs that lie ahead when the fighting stops. And in any long-range planning, it's worth while to take a look at some records:

Long before the war, "Caterpillar" Diesel earthmoving equipment had won its reputation for stamina, economy and dependability. You know the number of "Caterpillar" *firsts* in the field — from the original track-type tractor and the introduction of Diesel power to the operating ease of finger-tip control. You know, too, that sound engineering and thorough testing have always *proved* new "Caterpillar" developments before they appeared on the market. "Caterpillar" customers have no orphan machines.

The thousands of "Caterpillar" Diesels serving our Armed Forces in this war offer added evidence that these sturdy machines rate foremost preference when you put in your orders for new contracting equipment.

Soon the "Caterpillar" Diesels for civilian uses will again be rolling off the production lines. Through "Caterpillar" quality, Diesel economy, correct design, all types of matched equipment to fit the job — and through top-notch dealer parts and mechanical services that help keep the job rolling — "Caterpillar" means *lowest costs on earth.*

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

CATERPILLAR DIESEL

REG. U.S. PAT. OFF.

ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

TRAXCAVATE!

It's the MODERN Earth-Moving and Material-Handling Method

TRAXCAVATORS are the dependable tractor excavators that combine the usefulness of a shovel, loader, scraper, bulldozer, etc. in one machine. Powered by "Caterpillar" track-type tractors, with bucket capacities from ½ to 2½ cubic yards, these multi-purpose machines dig, load, grade, carry and do numerous other jobs quickly, easily and at low cost. Interchangeable attachments increase TRAXCAVATORS' versatility; give them year 'round utility; keep them working more hours on more jobs. "Traxcavate"! That's the efficient way of getting jobs done. Whether you have immediate war-urgent earth-moving and material-handling problems or want to plan for peacetime, write us *now* for the TRAXCAVATOR story and the name of the nearest Trackson-"Caterpillar" dealer. TRACKSON COMPANY, Milwaukee 1, Wisconsin.

TRAXCAVATOR

The Original Tractor Excavator

Meet Mr. Winslow Oil Conditioner. Important little gent, isn't he? And well he should be, for he has completed the most important year of his career.

In 1944 the nation completed the heaviest transportation job in its history. And more insistently than ever, maintenance men, engineers and operators demanded Winslow Oil Conditioners to protect their lubricating systems against motor-destroying substances.

Tests have proved that black, sticky, carbon and varnish be-smudged pistons with stuck rings can be cleaned without being removed, and maintained clean with Winslow elements being replaced as needed.

Winslow Replacement Elements—in more than 130 sizes made to fit any standard filter—clean oil quickly and thoroughly. Through the use of an exclusive design, Winslow oil conditioning elements are made to *Expand* with *Use,* thereby retaining their porosity and efficiency. This actually means longer life.

Proof in Use

The famous Hall-Scott model "400" truck engine which powers the Army's giant tank retriever is factory equipped with Winslow Oil Conditioners.

W WINSLOW ENGINEERING COMPANY, OAKLAND 8, CALIFORNIA

WINSLOW

FUEL FILTERS · OIL CONDITIONERS · ELEMENTS

SMITH
THE T. L. SMITH CO. MILWAUKEE, U.S.A.

WINNING COMBINATION *for* POSTWAR PLANTS!

In your plans for postwar expansion, don't overlook this winning combination—*Smith Tilting Mixers* for pre-mixing or pre-shrinking concrete, and *Smith-Mobile Agitators* for delivering the pre-mixed or pre-shrunk concrete to the job. Both machines are PROFIT MAKERS with a record of performance that has never been equaled. Their maintenance cost is almost negligible. Write today for descriptive literature.

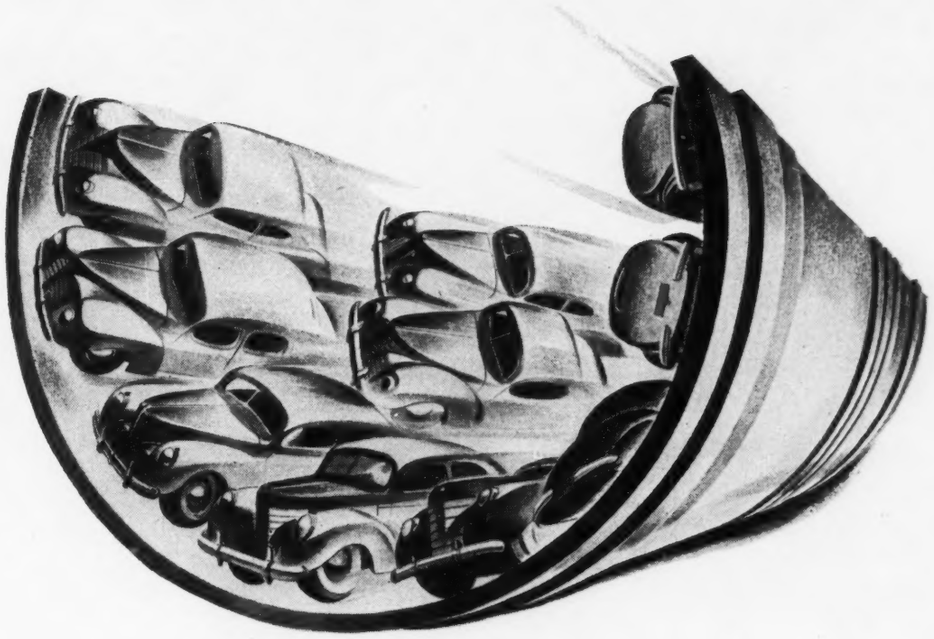
The T. L. SMITH COMPANY
2851 N. 32nd Street, Milwaukee 10, Wisconsin, U. S. A.

SMITH TILTING MIXERS
Famous all over the world for their fast charging, thorough "end-to-center" mixing and fast tilt and pour discharge. Ideal for central mixing plants because of low maintenance costs and rugged dependability, even when worked night and day. 4 sizes—from 1 to 4 cu. yds.

SMITH-MOBILE AGITATORS
Fast loading, smooth agitating, effective mixing and HIGH discharge. Fast pouring or slow controlled discharge, as desired. Large radius of spout distribution. Practically trouble-proof.

Equipment You'll be Proud to Own

SMITH-MOBILE



the most frequently traveled road

The most frequently traveled road is a very short one . . . only a few inches long. It is the cylinder in your gasoline or Diesel engine. And the piston and rings travel over this short road more than 3000 times a minute . . . 180,000 times an hour.

That is why cylinders wear out. But a new treatment of the surface slows up the wear rate tremendously.

PORUS-KROME, applied by Van der Horst process, multiplies the cylinder life four to twenty times, eliminates scoring and scuffing and greatly increases engine reliability.

PORUS-KROME is pure, hard chromium which is produced and bonded to the cylinder bore by this patented process. It has tiny pores and channels in its surface which serve as reservoirs for lubricating oil . . . feeding it back to the surface as needed. It reduces both corrosion and wear on cylinders and rings, and thus assures a substantial saving in engine operating costs.

Of course, you will want PORUS-KROME on the cylinders of your engines. But right now the entire capacity of the three Van der Horst plants is required to process cylinders of engines for war machines . . . tanks, submarines, landing craft, etc.

However, as soon as the war requirements are lessened, PORUS-KROME will be available to you in new engines and also in replacement liners for existing engines. Then you, too, can have this greater engine reliability. *Plan now* to use PORUS-KROME in your own engines.

VAN DER HORST

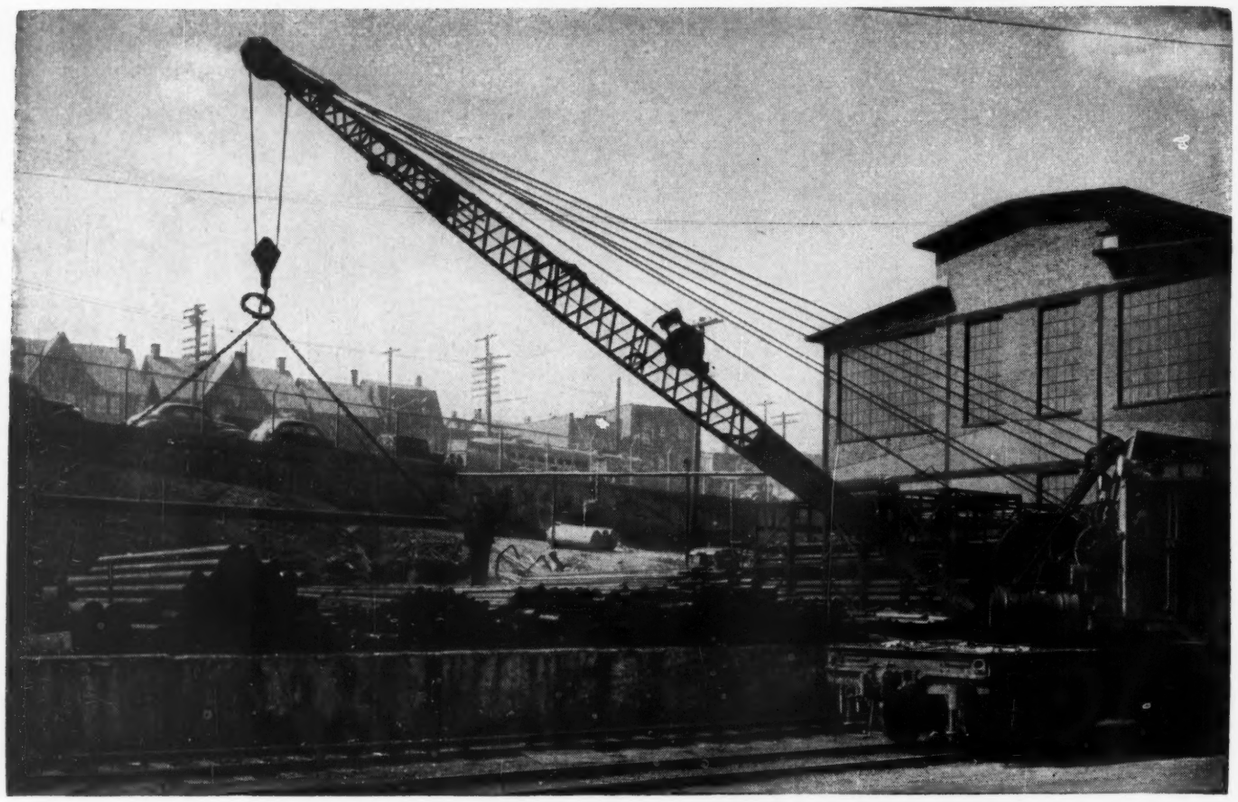
U. S. PATENTS 2,048,578 AND 2,314,604

PORUS - KROME

Good for the Life of your Engines

VAN DER HORST CORPORATION OF AMERICA OLEAN • NEW YORK CLEVELAND 11 • OHIO

AN AFFILIATE OF DRESSER INDUSTRIES



When a crane takes a vacation...
IT'S EXPENSIVE

Whether your crane rolls on wheels or crawls on treads, it's a big, powerful, friendly brute that's as willing as a St. Bernard dog—and even more responsive.

But, without those sinewy ropes on its various lines, the big fellow couldn't do a thing. So it's money in your pocket to see that the *right* ropes are there in the first place—ropes that stand up to the wear and tear and grief imposed by heavy loads and bending stresses.

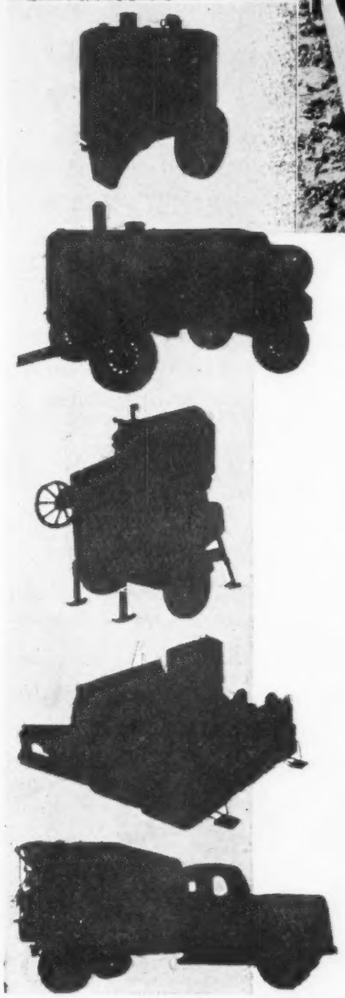
By right ropes, we mean Purple Strand of the proper construction for this sort of work. When you buy Purple Strand, you're getting the toughest steel that ever goes into the making of rope—steel from selected heats that are closely controlled and supervised every step of the way by Bethlehem metallurgists. Purple Strand means premium quality from crown wire to core.

For hoisting, holding, and closing lines, you'll find that it pays to use Purple Strand Form-Set (preformed). The preforming process takes the "wildness" out of a rope; makes it easier to bend around sheaves, and facilitates spooling. Even more important, it adds life to the rope by making it more flexible—hence less susceptible to bending fatigue.

That crane can be a mighty good friend when you need to move big loads in a hurry. If it's reeved with Purple Strand, you'll keep it on the job a lot longer.

When you think WIRE ROPE
... think BETHLEHEM

Plan for FULL SPEED AHEAD with JAEGER *Advanced* EQUIPMENT



When present billions in "Postwar Projects" start becoming billions in biddable jobs, your Jaeger distributor will be there with the better methods and machines you'll need to meet bid competition.

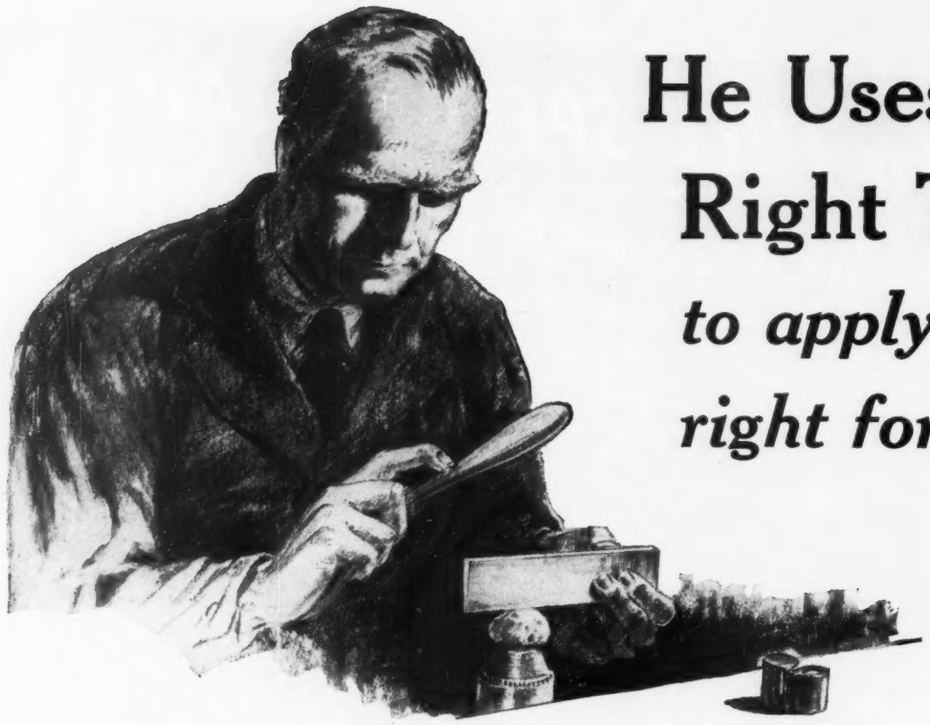
Right now, he and a hundred others are here at our Columbus plant, studying the results of 3 years of quiet development by the same company that originated the mechanical spreading and finishing of pavements, the end-discharge concrete mixer, the modern self-priming centrifugal pump, the truck mixer and the "touch control" hoist as used by contractors today.

He's seeing new things, including precision-built air compressors. Ask him about them when he gets back home.

THE JAEGER MACHINE COMPANY

800 Dublin Avenue, Columbus 16, Ohio

MIXERS • PUMPS • HOISTS • TRUCK MIXERS
AIR COMPRESSORS • MATERIAL LOADERS



He Uses the Right Tool *to apply the right force*

PERFECTLY cut diamonds, and perfect blasting, are the result of studying the job, then applying the right force in the right place with the right tool.

Diamond cutters try to cleave the rough stone to get the largest gem free of flaws. Blasters want the right fragmentation with the rock laid down at the right spot to get the best use of equipment and men.

The tool of the blaster is the explosive. Picking the right tool, and using it the right way, calls for consultation and cooperation.

GIANT GELATINS (AMMONIA GELATINS)

GRADE	Velocity, feet per second, in the open 1¼" x 8"	Velocity, feet per second, confined in pipe 1½" x 8"	MINIMUM NUMBER OF 8" CARTRIDGES PER 50 LBS. (MAXIMUM 10% MORE)								
			⅞"	1"	1⅛"	1¼"	1½"	1¾"	2"	4"	5"
90%	20000	22900	195	153	121	100	68	53	39	10	7
80%	18000	21000	195	153	121	100	68	53	39	10	7
75%	17500	21000	195	153	121	100	68	53	39	10	7
60%	16000	20000	194	149	117	97	65	50	38	9	6
50%	9000	17700	179	138	111	90	62	46	35	8	6
40%	8000	15000	179	138	111	90	62	46	35	8	6
35%	7500	10500	170	131	106	85	58	44	33	8	6
30%	7000	10500	170	131	106	85	58	44	33	8	6

For the right explosive, consider:

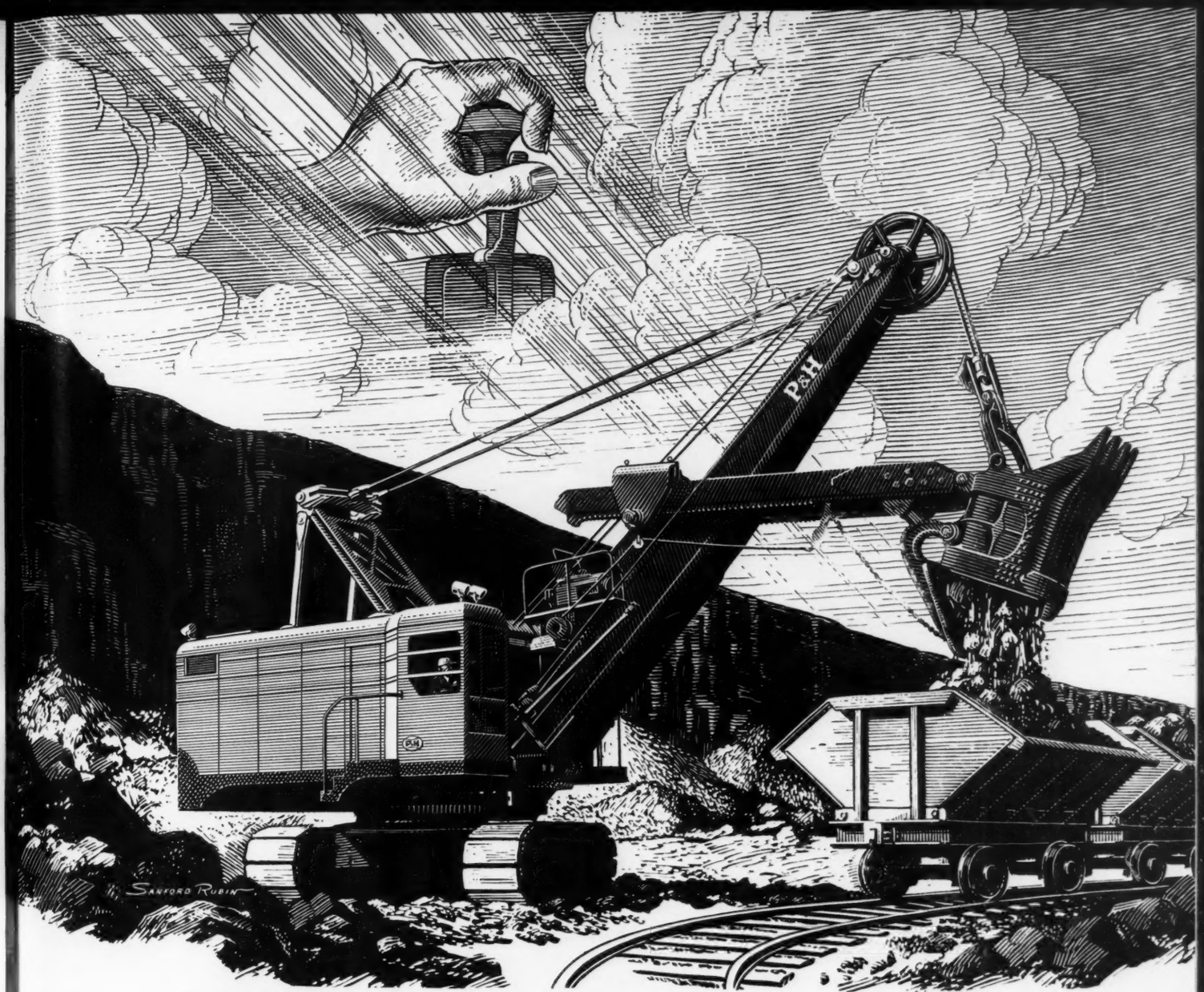
GIANT GELATINS (Atlas Ammonia Gelatins). High velocity under confinement. Shattering. High loading density. Plastic. The 30% to 60% strengths are used extensively underground. Satisfactory water resistance.

Go over your job problems with the Atlas Representative, he is a specialist on explosives and methods.

ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • *Offices in principal cities* • *Cable Address—Atpowco*



NEW! P&H DIRECTRON CONTROL

— the simplest, smoothest, most efficient control ever applied to an electric shovel

America's open pit mines and quarries have long felt the need for better electric shovel control — for the simplification of motor and motor generator design, and auxiliary control equipment with its complicated relays, resistors, and switchboard panels.

Through years of research and development—P&H has perfected the revolutionary new Directron Control. Simpler, more direct, more dependable, this control overcomes maintenance problems and adds years to the life of all electrical equipment. It also allows more time for actual digging.

In addition, Directron Control provides the quick, velvety response for steady production and levels out the power peaks to reduce power line charges to a minimum.

Another development in P&H's sixty-year experience of applying electrical power to the movement of heavy loads, it is but one of many outstanding advancements found in the new P&H Electric Shovels. Write for complete information.

P&H ELECTRIC SHOVELS
4494 W. NATIONAL AVE.
MILWAUKEE 14, WISCONSIN

HARNISCHFEGER CORPORATION
EXCAVATORS · ELECTRIC CRANES · ARC WELDERS · HOISTS · WELDING ELECTRODES · MOTORS

THE GREATEST FORWARD STEP IN ELECTRIC SHOVEL DEVELOPMENT

Any haul rides freer on this EASIER ROLLING TIRE

Allis-Chalmers Diesel Tractor pulling a Gar Wood Scraper equipped with Goodyear All-Weather Earth-Movers.

IN earth-moving operations—large or small—costs come down when loads move easier on tires that really roll.

That's why more contractors than ever before now buy Goodyear All-Weather Earth-Movers for their drawn units. They know that those wider tread channels and rounded, sturdy diamonds mean protection against snagging—assure freer rolling that keeps the *heaviest* loads moving on schedule.

As rugged as they are sure-footed, these full flotation tires are fortified with a tougher bead construction which provides security against rocking, chafing and rim cutting. And the deep-bite diamond blocks of that time-proved All-Weather tread assure positive traction. prevent side-slip.

Now further armored with Goodyear's patented Rayotwist cord—*the strongest body we've ever used in a work tire*—these tough giants are by far the best that can be built from synthetic and permissible natural rubber. We believe them to be the longest-lasting, most efficient work tires available today.

Once you get the performance story from the men now using them, you will probably want Goodyears on all your units.

THE RIGHT TIRE FOR EVERY JOB
Rayotwist-armored for extra strength

For drive wheels, Goodyear's
O·P·E·N C·E·N·T·E·R
self-cleaning tread gives more pull, more traction

ALL-WEATHER EARTH-MOVER for drawn vehicles
HARD ROCK LUG for all rock work
SURE-GRIP for drive wheels

PRODUCTS OF GOODYEAR RESEARCH

All-Weather, Rayotwist, Sure-Grip—T.M.'s The Goodyear Tire & Rubber Company

BUY WAR BONDS • BUY FOR KEEPS

GOODYEAR

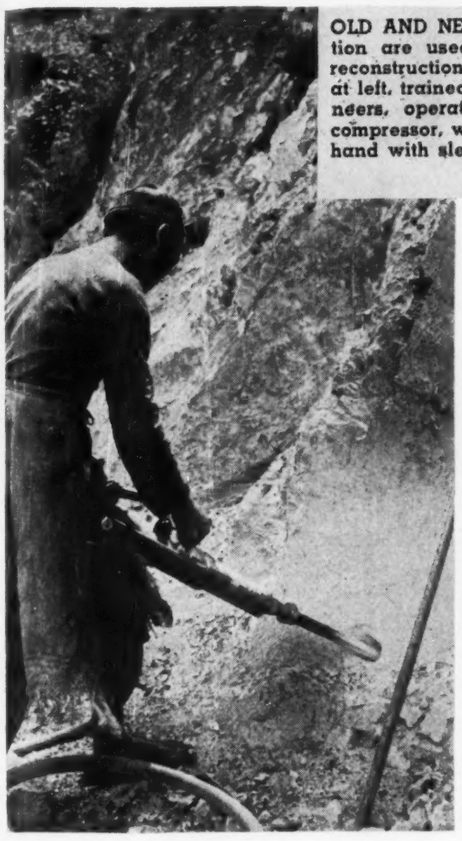
THE GREATEST NAME IN RUBBER

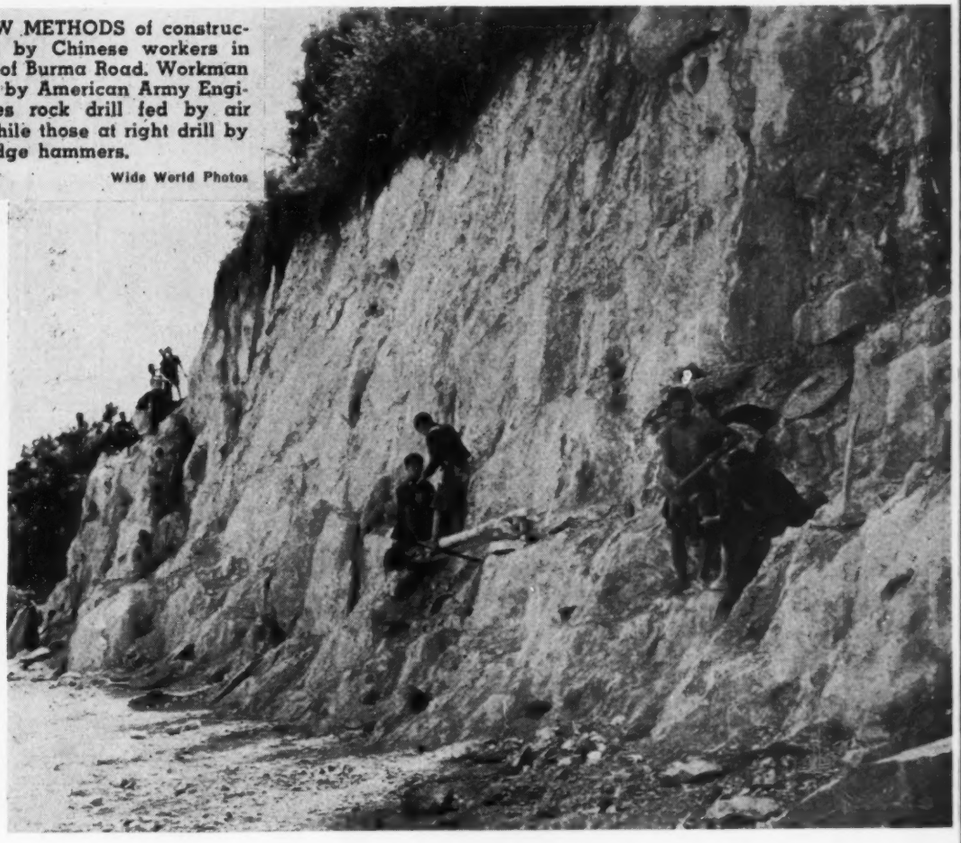
MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

Construction Methods

ROBERT K. TOMLIN, Editor

Volume 27 | JANUARY, 1945 | Number 1





OLD AND NEW METHODS of construction are used by Chinese workers in reconstruction of Burma Road. Workman at left, trained by American Army Engineers, operates rock drill fed by air compressor, while those at right drill by hand with sledge hammers.

Wide World Photos

Burma Road Rebuilt by Chinese and American Engineers

CHINESE AND AMERICAN ENGINEERS are working together in the wake of Chinese troops in Burma to repair the Burma Road. The ancient highway is being reconstructed into a two-way traffic route designed for modern military transportation and linked with the new Ledo Road from India, so that American supplies in quantity can reach the troops battling the Japs. The Engineers have to widen the road, strengthen bridges and culverts, smooth curves, improve drainage and surface the highway.

The Yunnan-Burma Highway Engineering Administration, a Chinese organization, does the work of construction and is in full charge of the project. Engineers of the U. S. Army function mainly in an advisory capacity. The Americans advise and consult, train personnel and provide technical aid. To every American engineer is assigned more than 1,000 Chinese workers. These Chinese, untrained and unfamiliar with construction machinery, have learned to use American bulldozers, air compressors and other equipment and tools. They have already widened 220 mi. of the 470-mi. route.

AMERICAN BULLDOZER and Chinese laborers carrying crushed rock in baskets suspended from yokes across their shoulders work together on Burma Road.

British Combine Photo

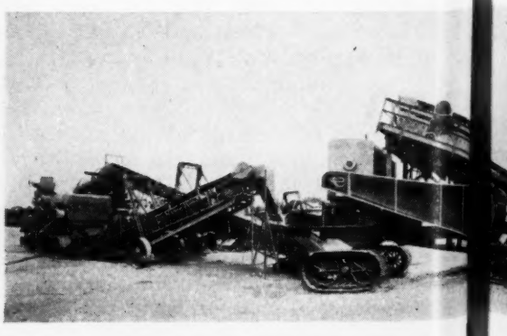
CORDUROY ROAD through Hurtgen Forest, near Zweifall, Germany, is constructed by Engineers of U. S. Army Infantry Division.
Signal Corps Photo

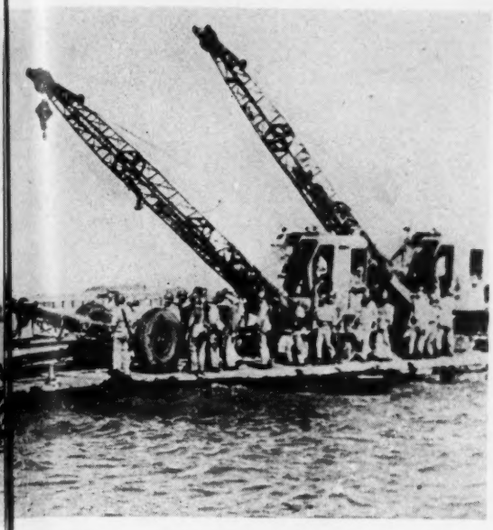
NEW WATERLOO BRIDGE (below) is opened to traffic. This 6-lane structure replaces temporary bridge which served London for 17 yr. After its demolition, old steel was salvaged for munitions.
British Combine Photo

THIS MONTH'S NEWS REEL

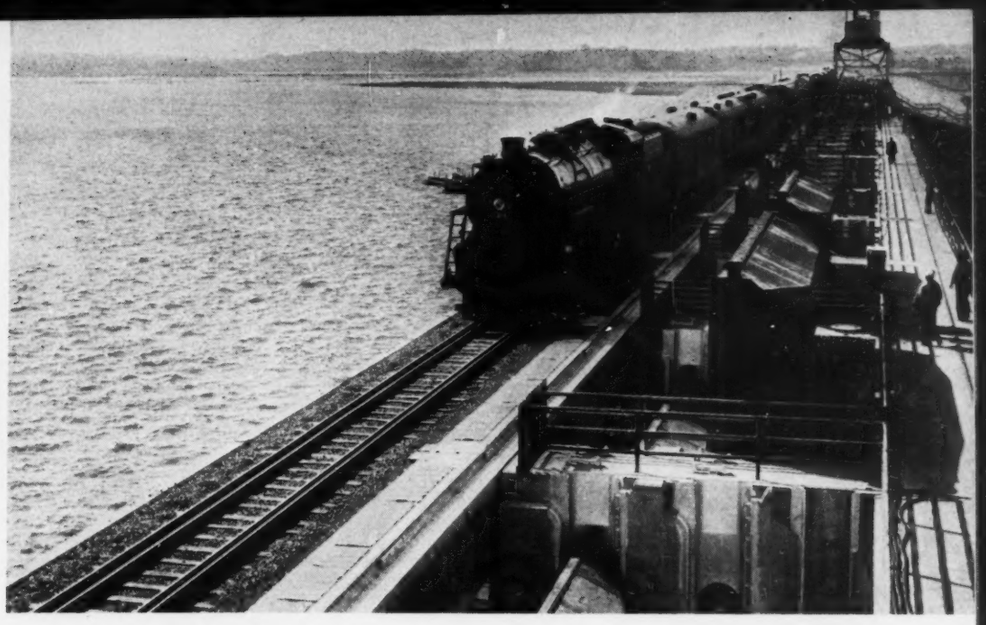
ANDERSON RANCH DAM (below), worlds highest earthfill structure 456 ft., is being pushed to completion by U. S. Bureau of Reclamation, with 40 percent of 8,800,000 cu. yd. of earth and rock embankment now in place. Conveyor belt transports about half of embankment material from pit 2 mi. from dam and 1,000 ft. higher and discharges down abutment at left center. Dam is located 40 mi. southeast of Boise, Ida. H. F. Bahmeier is construction engineer for Reclamation Bureau.

GRAVEL FOR SURFACING supply roads in France is provided by huge Pioneer rock crusher plant (below) operated by U. S. Army Engineers. Material passes from right to left, via belt conveyors, over feeder, through jaw crusher, to second crushing and screening unit, to washer, to final crusher.



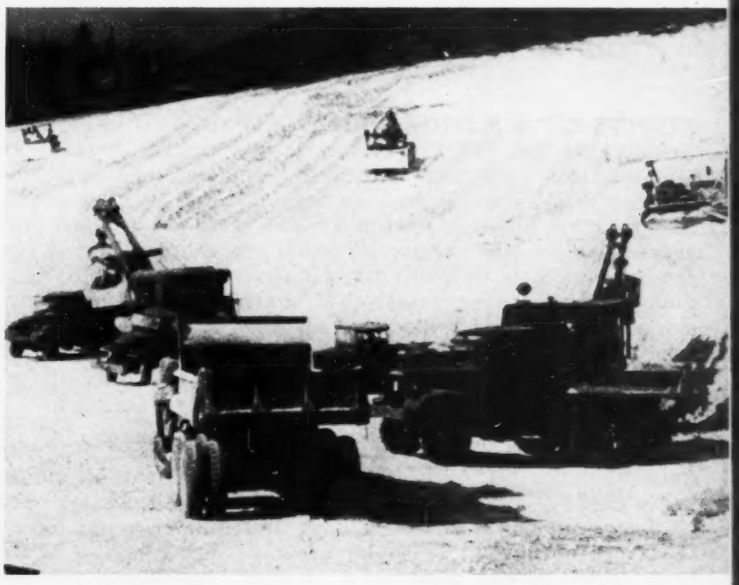


SUPPLIES AND HEAVY EQUIPMENT are brought ashore by Caterpillar tractor over LST-borne Seabee-operated ponton causeway in Marshall Islands. Portable welded steel box units were brought thousands of miles and assembled at site. Reef necessitated leaving slight gap between end of causeway and beach. U. S. Navy Official Photo



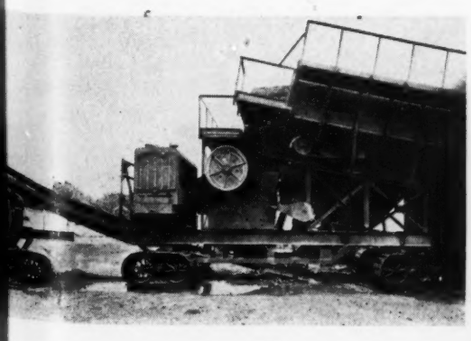
FIRST TRAIN CROSSES TVA's Kentucky Dam with Kentucky's governor and railroad executives aboard. Illinois Central R.R. trains formerly crossed Tennessee River on nearby bridge which is to be removed.

POST-WAR CONSTRUCTION of public works in Beaver County, Pa., on Ohio River downstream from Pittsburgh, will follow lines pointed out on map by MICHAEL BAKER, JR. (right), consulting engineer, Rochester, Pa., who developed plan here being shown to FRANCIS A. PITKIN (extreme left), executive director, Pennsylvania State Planning Board, and WALTER H. BLUCHER, executive director, American Society of Planning Officials, during Southwestern Institute on Pennsylvania Municipal Post-War Planning in Pittsburgh. Same map was exhibited at annual convention in St. Paul, Minn., of American Public Works Association by Mr. Baker, who is chairman of planning committee of A.P.W.A.



TOKYO IS DESTINATION of bombers that take off from Saipan, less than 1,500 mi. from Japanese homeland. U. S. Navy Seabees and Army Engineers operate power shovels, bulldozers and trucks to convert this tiny island into base for B-29 Superfortresses. European Photo

MOUNTED ON TRAILER (below), huge rubber ponton is on way to Moselle River in France where it will form section of bridge to be built by Army Engineers. Acme Photo



Post-war Roundup

Of State Highway Projects

Shows Half of One Year's Quota Ready to Go

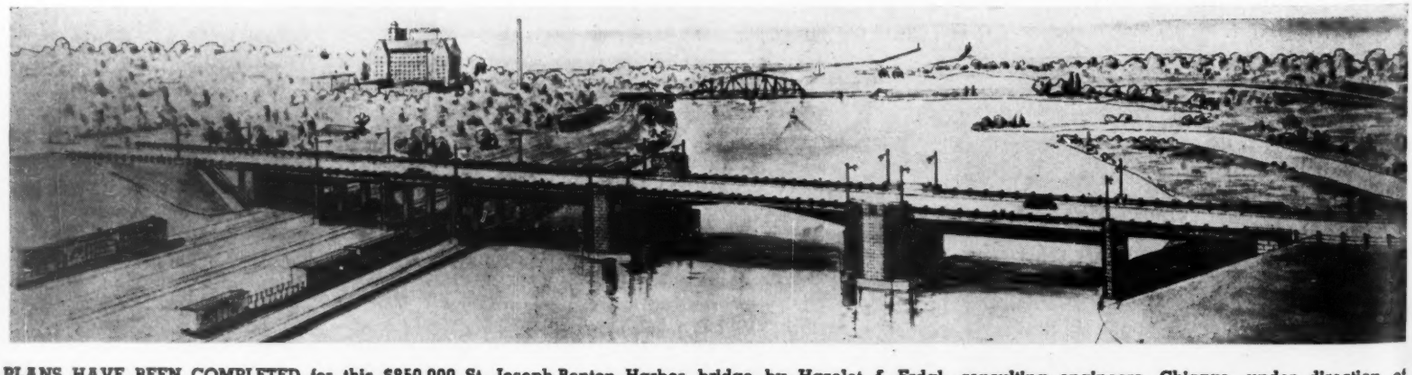
By VINCENT B. SMITH
Associate Editor

RESULTS OF A NATION-WIDE QUESTIONNAIRE SURVEY just completed by CONSTRUCTION METHODS indicate that state highway departments are making commendable progress toward adequate preparation for post-war construction of projects in their jurisdictions. Rather than give rise to any feeling of complacency, the data tabulated in the accompanying summary may be expected to act as a tonic and a stimulant to state highway officials in pushing ahead with the good work they have started. The tabulated figures show that the states could advertise post-war projects to the value of $283 million within 30 days, $189 million within 30 to 60 days and $252 million within 60 to 90 days, a total for the 90-day period of $724 million. Volumes reported in the table represent honest estimates by state highway officials in answer to this question, submitted to them late in November: "If Germany surrenders by Dec. 31, 1944, and you are authorized on Jan. 1, 1945, to put as many projects as possible under contract during the remaining months of the winter, what estimated value of projects would you be able to advertise for bids: A. Within 30 days; B. Within from 30 to 60 days; C. Within from 60 to 90 days."

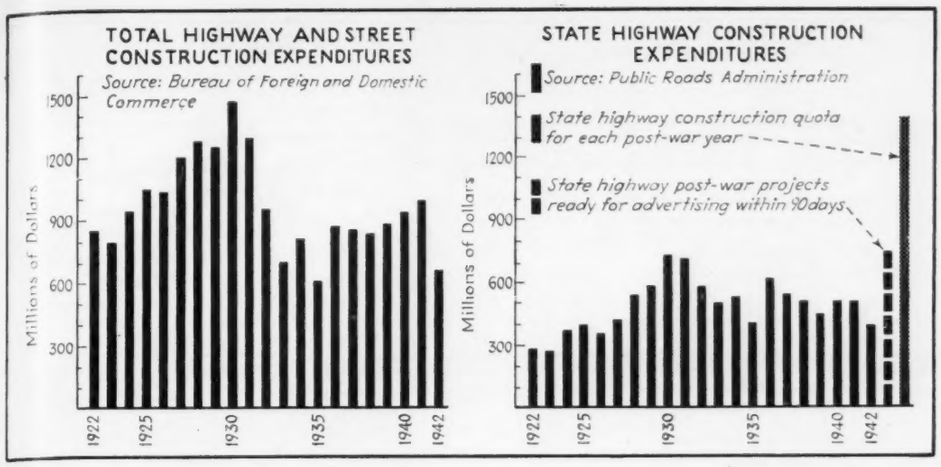
Post-War Needs

A total of almost three-quarter billion dollars, as set out in the accompanying table, would have made a highly satisfying volume of state highway construction in any pre-war year. For post-war needs, however, the sights must be raised considerably. Looking ahead to the first post-war year, the total shown in the table represents about one-half of the state highway construction volume which ought to be made ready in advance for letting and building to completion during that year.

On several bases of reasoning, it is proper to project a $1.4 billion state highway construction budget for each post-war year. Many technical groups, such as the American Society of Civil Engineers, and associations of business men, such as the Committee for Economic Development, agree that high-level employment after the war will require and will produce high-level national income of around $140 billion per year. Prorated in accordance with past records, construction should equal nearly 11 percent, or $15 billion, of this annual national income. In this construction figure,



PLANS HAVE BEEN COMPLETED for this $850,000 St. Joseph-Benton Harbor bridge by Hazelet & Erdal, consulting engineers, Chicago, under direction of Michigan State Highway Department. Structure, measuring 713 ft. between abutment backwalls, includes double bascule section with 164-ft. span, c. to c. of rollers, to provide 100-ft.-wide clear river channel. Bridge will benefit traffic on U. S. 31, major tourist artery, by shortening distance and eliminating several miles of travel through two cities.



TOTAL CONSTRUCTION EXPENDITURES for streets and highways equal sum of state expenditures (at right) plus municipal and county expenditures. In years from 1929 to 1942, inclusive, state highway construction expenditures averaged 57.5 percent of total expenditures. Increased construction programs after war will call for about $1.4 billion per year of state highway work, including federal aid, as explained in accompanying text. State highway departments now have $724 million of post-war projects which they could advertise for bids within 90 days, if so ordered.

streets and roads would be expected to account for $2.45 to $2.50 billion per year, of which about $1.4 billion, including federal aid, would be for projects built under state highway department jurisdiction. These highway quotas, projected for a post-war year, are in accord with historical ratios for the classifications named.

Construction Arrearages

Other courses of reasoning lead to the same conclusion. Statements of accumulated highway construction arrearages for the three war years of 1942, 1943 and 1944, as presented on several occasions by Commissioner Thomas H. MacDonald of the Public Roads Administration, definitely point out that a highway construction program of $2,508 million per year for three years would be needed to make up the war deficit and put the country back in step with the highway improvement schedule which the war interrupted. This annual total would almost necessarily call for construction expenditure of $1.4 billion per year under the jurisdiction of state highway departments.

Post-War Finances

With regard to available finances, the post-war highway bill passed by Congress Dec. 12, 1944, and signed by the President eight days later, provides $500 million of federal aid per year for three years. As this money is to be matched equally by the states, it could mean nearly $1 billion per year for federal-aid projects. Even after making allowance for the fact that not all states will take up their full apportionments within the twelve months of each fiscal year, the annual federal-aid total still will far exceed any figure attained in the past.

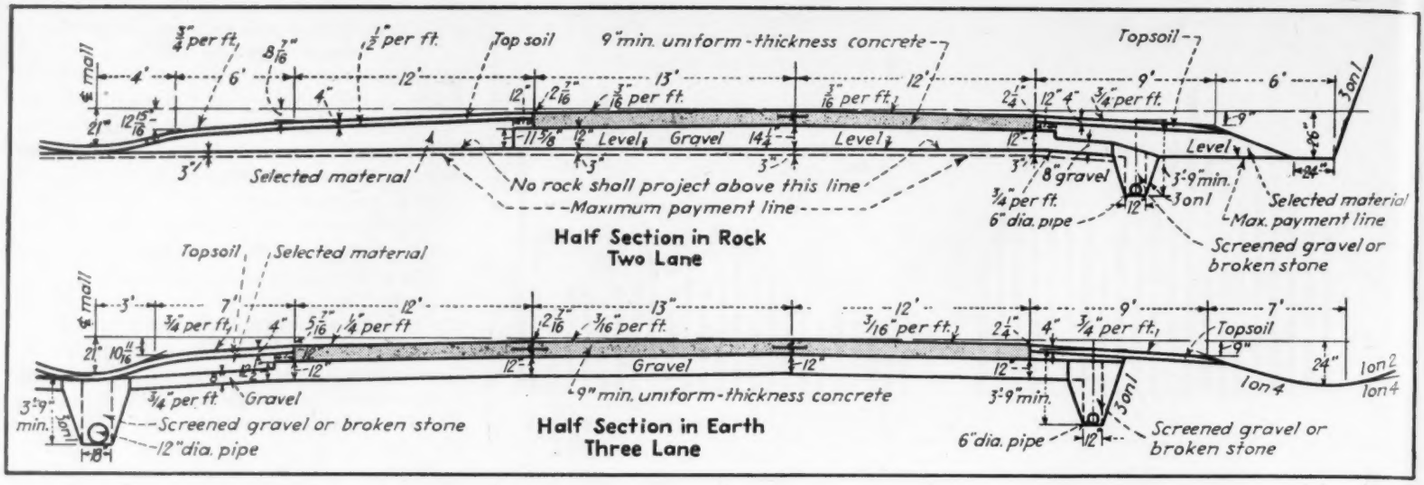
To this federal-aid project volume will be added the large amount of non-federal-aid work normally constructed by the state highway departments. This latter figure may undergo a slight recession below pre-war peaks in the first year or two after the war, because of possible decreases in highway revenues resulting from reduction in the number of motor vehicles, but this possibility is not expected to have any serious effect on state highway construction volume.

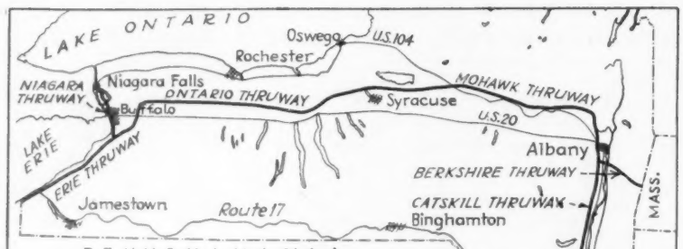
In the years 1931-42, state construction expenditures totaled $3,802 million, exclusive of federal aid, an excess of $1,294 million above the $2,508 million

VOLUME OF STATE HIGHWAY POST-WAR PROJECTS READY OR NEARLY READY FOR BIDS

(Thousands of Dollars)

STATES	COULD BE ADVERTISED WITHIN			Total Within 90 Days	AVAILABLE FEDERAL AID	
	30 Days	30 to 60 Days	60 to 90 Days		Existing Unobligated Allotments Nov. 30, 1944	Post-War Highway Act Approx. Annual Apportionment
Maine	4,430	1,947	2,140	8,517	667	3,914
New Hampshire	1,000	1,250	1,500	3,750	882	2,303
Vermont	400	400	800	1,600	476	2,040
Massachusetts	13,000	2,000	2,000	17,000	4,435	10,343
Rhode Island	1,000	2,000	2,000	5,000	462	2,951
Connecticut	12,000	2,000	1,000	15,000	955	4,769
New England	**31,830**	**9,597**	**9,440**	**50,867**	**7,877**	**26,320**
New York	10,000	20,000	20,000	50,000	8,953	33,892
New Jersey	10,100	6,850	4,900	21,850	2,278	9,433
Pennsylvania	15,000	10,000	25,000	50,000	4,810	24,973
Maryland	—	—	7,000	7,000	507	4,792
District of Columbia	8,036	3,131	1,696	12,863	31	2,974
Delaware	3,000	500	500	4,000	1,931	2,032
Middle Atlantic	**46,136**	**40,481**	**59,096**	**145,713**	**18,510**	**78,096**
Virginia	10,000	5,000	5,000	20,000	3,724	8,796
West Virginia	9,978	—	15,823	25,801	540	5,362
North Carolina	6,100	1,700	1,700	9,500	4,395	11,379
South Carolina	17,000	2,000	2,000	21,000	2,421	6,222
Georgia	—	6,000	5,000	11,000	6,391	11,582
Florida	750	750	1,000	2,500	2,647	7,005
Alabama	2,500	500	1,000	4,000	2,876	9,747
Mississippi	3,000	1,000	2,000	6,000	3,094	7,975
Louisiana	7,300	5,700	3,900	16,900	4,692	7,428
Kentucky	3,000	5,000	10,000	18,000	582	8,908
Tennessee	—	3,000	5,000	8,000	1,971	10,030
Southern	**59,628**	**30,650**	**52,423**	**142,701**	**33,333**	**94,434**
Ohio	3,000	7,000	18,000	28,000	1,050	20,103
Indiana	15,000	15,000	5,000	35,000	2,047	12,090
Illinois	12,150	6,375	5,975	24,500	3,238	23,120
Wisconsin	—	5,000	5,000	10,000	5,570	11,770
Michigan	10,000	3,500	6,500	20,000	275	16,638
Middle West	**40,150**	**36,875**	**40,475**	**117,500**	**12,180**	**83,721**
Minnesota	2,500	3,500	4,000	10,000	1,534	12,432
Iowa	5,000	1,000	1,000	7,000	1,431	11,139
Missouri	5,000	10,000	1,000	16,000	2,408	14,374
Arkansas	—	—	—	—	534	7,515
North Dakota	1,000	1,000	2,500	4,500	2,751	5,975
South Dakota	2,000	1,000	1,500	4,500	3,741	6,273
Nebraska	7,000	500	500	8,000	1,287	8,418
Kansas	3,000	5,000	5,000	13,000	5,024	10,742
Oklahoma	10,000	2,000	3,000	15,000	6,358	10,142
Texas	40,000	20,000	30,000	90,000	8,617	28,765
Montana	1,000	3,000	4,000	8,000	4,403	7,963
Wyoming	300	700	1,000	2,000	1,543	4,826
Colorado	—	—	9,000	9,000	2,105	7,692
New Mexico	2,000	1,000	1,000	4,000	1,074	6,412
West of the Mississippi	**78,800**	**48,700**	**63,500**	**191,000**	**42,810**	**142,668**
Idaho	1,680	690	1,035	3,405	726	4,946
Utah	2,000	1,000	2,000	5,000	86	4,651
Arizona	1,000	1,000	1,000	3,000	467	5,728
Nevada	3,500	800	1,100	5,400	165	4,851
Washington	8,000	8,000	9,000	25,000	109	7,399
Oregon	2,500	2,500	2,500	7,500	269	7,085
California	8,000	9,000	10,000	27,000	3,353	22,303
Far West	**26,680**	**22,990**	**26,635**	**76,305**	**5,175**	**56,963**
UNITED STATES	**283,224**	**189,293**	**251,569**	**724,086**	**119,885**	**482,202**





480 MI. OF THRUWAY for New York State (left and above), estimated to cost $225,000,000, is expected to be completed within five years after war. Catskill, Mohawk, Ontario, Erie and Niagara Thruways already have been placed on state highway map by action of legislature; Berkshire and New England Thruways are proposed. Thruway law envisages toll-free, all-purpose limited-access highway of divided six-lane construction (most of it four-lane initially) on 200-ft. minimum right-of-way utilizing as much waste land as possible, bypassing cities but providing quick access to them, with all crossings separated, adequate interchanges, acceleration and deceleration lanes, designed for speed of 70 m.p.h., maximum grades of 3 percent, maximum curvature of 2,800-ft. radius, minimum sight distance of 1,000 ft., no traffic lights, fencing of entire route permitted.

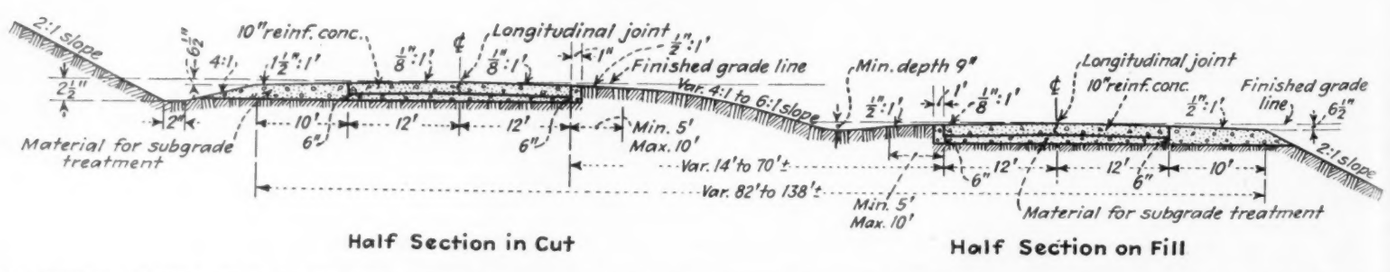
federal contribution for the same period. Although these totals cover the depression years, when federal participation was relatively greater than normal, the state construction expenditure exceeded the federal expenditure by more than 50 percent. This record would indicate that, with the states in much more prosperous condition, they will be able to carry on an annual highway construction program of $1.4 billion, including federal aid, after the war.

With minor exceptions, the states show confidence in their ability to match federal aid under the recently enacted highway bill. A number of the states require action by their legislatures, and a few need bond issues or other special means of raising funds to match their apportionments, but only three, apparently, feel that they cannot fully match their future allotments.

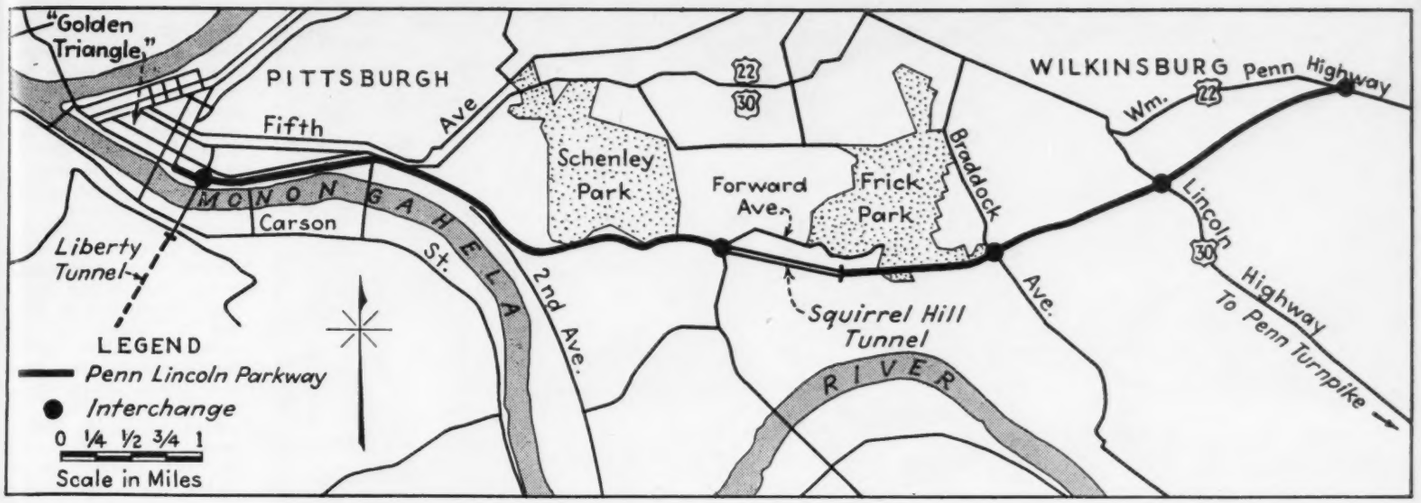
Informative estimates of state highway department income and other road-user revenue for 1945, 1946 and 1947 were prepared by the Public Roads Administration at the request of Senator Carl Hayden of Arizona and inserted by him in the Congressional Record of Sept. 21, 1944. For the 48 states and the District of Columbia, these estimates are as follows, in three classifications: (A) Estimated receipts of state highway departments; (B) Additional road-user revenue for local roads and streets, and (C) Additional road-user revenue for non-highway purposes, for each of the three years: 1945—(A) $762,366,000, (B) $297,211,000, (C) $98,232,000, total (1945) $1,157,809,000; 1946—(A) $843,541,000, (B) $319,845,000, (C) $107,461,000, total (1946) $1,270,847,000; 1947—(A) $973,043,000, (B) $355,259,000, (C) $120,356,000, total (1947) $1,448,648,000.

As explained by PRA, the additional road-user revenues for local roads and streets (indicated by (B) above) are the legal allocation of state highway-user revenues to subdivisions of the states. In some states there is considerable freedom as to how the local units of government shall expend these shared taxes. In other states, the expenditure must be approved by the state. There is no present provision for any of these funds to be used for matching federal aid. Any matching to be done will be either by decision of local officials or possibly by compulsion under new legislation. It seems probable that in most, if not all, instances the local units will be entirely willing to cooperate in this respect.

Legislatures of 44 states meet this month. On the calendars of these assem-



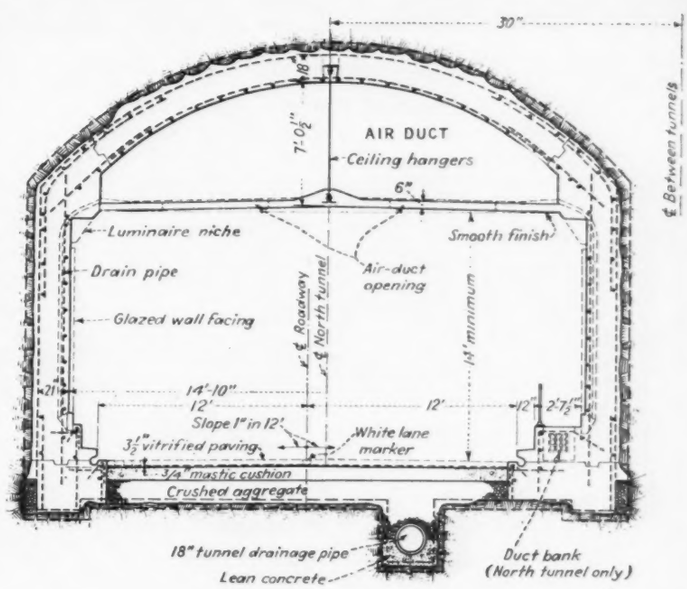
ON MINIMUM RIGHT-OF-WAY 300 FT. WIDE. Virginia's post-war plans call for extending Shirley Memorial Highway additional 15 mi. at cost of $4,000,000 from Arlington-Fairfax county line, 2½ mi. south of Pentagon network, to connection with U. S. 1 at Woodbridge. Project is planned as four-lane divided expressway with adequate structures for access and traffic interchange, maximum curvature of 1 deg. and maximum grade of 3½ percent.

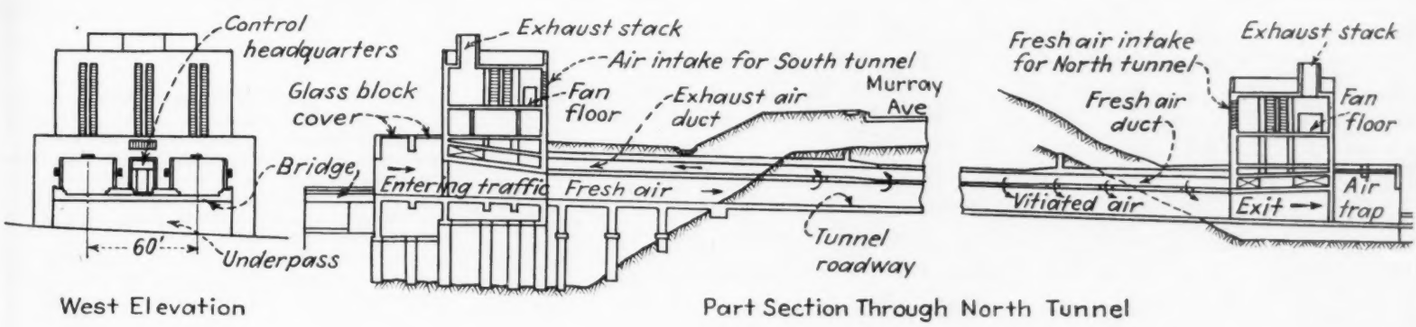


TWO-WAY REVERSIBLE VENTILATION is feature of 4,225-ft. Squirrel Hill twin-tube tunnel (above, right and below) designed with assistance of Ole Singstad, New York, by Michael Baker, Jr., Rochester, Pa., consultant to Pennsylvania Department of Highways on $25,000,000 Penn-Lincoln Parkway extending 9 mi. east from Pittsburgh's "Golden Triangle." In first half of tube, entering vehicle draws fresh air with it, and vitiated air is drawn out through overhead duct. From midpoint to exit, fresh air is blown into tunnel through overhead duct, and exhaust air flows out with traffic to exit. If fire occurs in latter half of tube, operator in ventilation building reverses air flow to draw off smoke through overhead duct. At exit is air trap, consisting of wide roof opening over roadway, which will function as port when wind acts directly against outflowing air, permitting head-on air currents to be deflected upwards and thus preventing static air condition from developing.

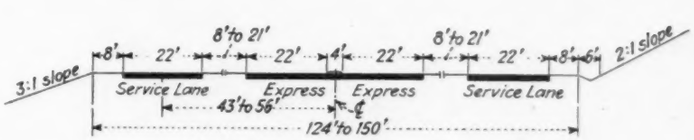
blies, an important need affecting the future of the federal-aid highway construction will be passage of legislation delegating to the state highway departments proper authority to deal with local governments in extending financial aid to projects on urban streets and secondary or feeder roads. The new federal highway act authorizes appropriations for both of these classes of highways and directs that the money be distributed in each state by the state government. Legislation is needed to set up the machinery for the distribution through the state highway departments.

Contractors' Capacity—Questions still

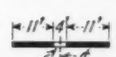




STAGE CONSTRUCTION of Louisville Belt Highway (right) calls for final grading on right-of-way acquired to ultimate width, with later improvements to be constructed as needed, fitting into Kentucky policy of "pay as you go" by spreading costs over term of years. Cost of perimeter road is expected to be about $75,000 per mile initially and about $125,000 per mile ultimately; additional cost for right-of-way will vary widely in rural and urban sections of route.



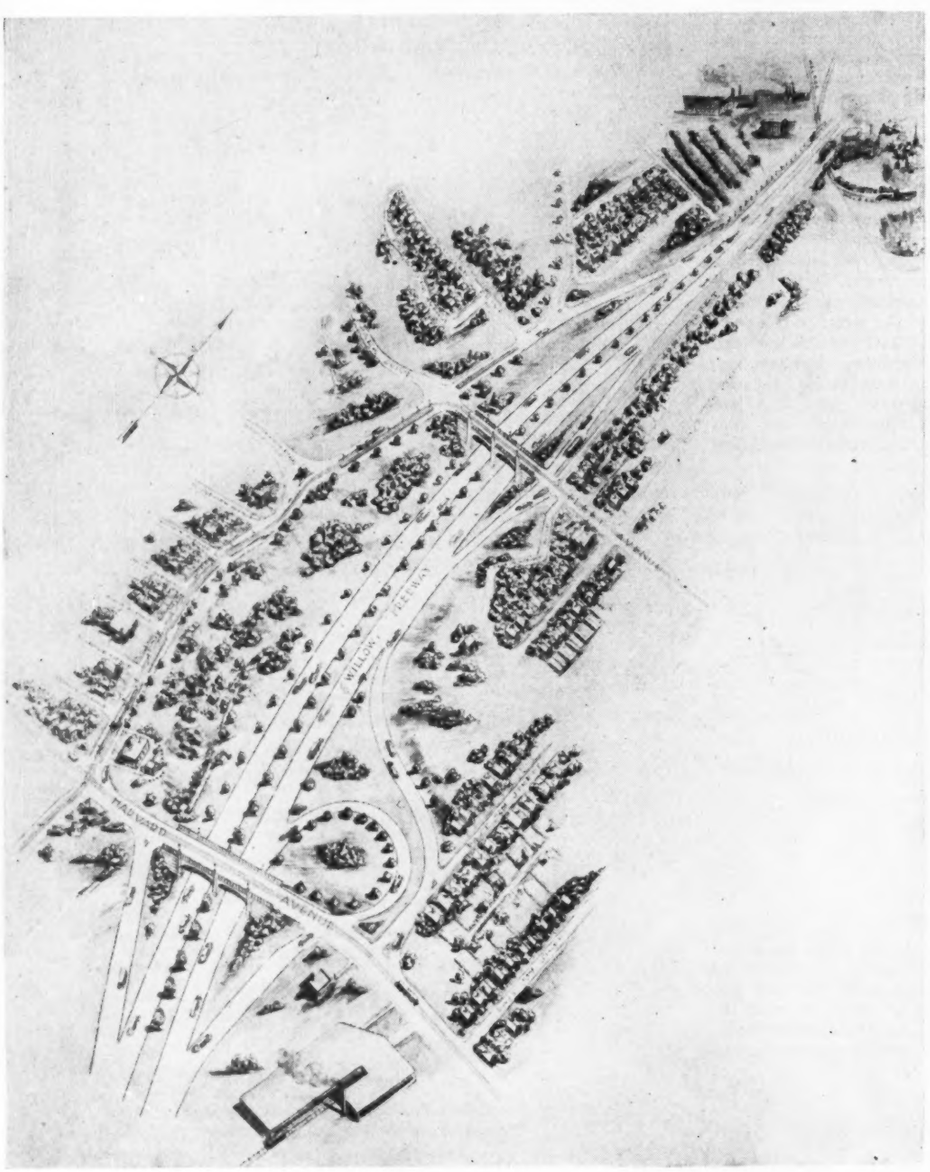
Final Section



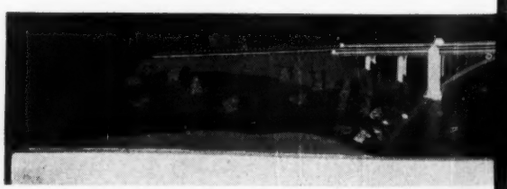
This area so paved that it may be used later to accommodate traffic division strip

Initial Construction

TRAFFIC INTERCHANGE (left) planned by Oregon Highway Commission for east end of Steel Bridge, existing double-deck railroad-highway structure across Willamette River at Portland, Ore., is part of general scheme of arterial street development, already partially completed, along shoreline of city's harbor. This interchange is estimated to cost $420,000, and another at west end of bridge, in city proper, $900,000. Completed cost of entire Harbor Drive improvement, nearly 4 mi. long, is reported by C. B. McCullough, assistant state highway engineer, to be about $6,200,000, including $2,300,000 for right-of-way.



are asked occasionally as to whether contractors could absorb highway construction at the rate contemplated and simultaneously carry proportionately heavy volumes of other classes of construction. All information gathered on this problem by the Associated General Contractors and presented by that organization to Congressional committees indicates that the contractors are perfectly capable of discharging the task as soon as men and materials are released for the purpose. Equipment in contrac-



TO PROVIDE HIGH-LEVEL ENTRANCE over Annisquam River into Gloucester, eliminating delays caused by frequent opening of present low-level drawbridge to pass water-borne traffic, Massachusetts Department of Public Works has construction plans more than 60 percent complete for 860-ft. structure featuring 420-ft. steel girder arch which will have 65-ft. minimum clearance above high water in channel width of 100 ft. Foundations for all spans will rest on ledge rock. About 18 months construction time will be required to complete $1,000,000 bridge and approaches according to estimate of R. O. Spofford, bridge engineer, furnished by R. W. Coburn, chief engineer.

WILLOW FREEWAY (left) in Cleveland, located along eastern rim of Cuyahoga River valley, begins south of city and terminates at traffic interchange with proposed Newburgh Freeway 2 mi. from central business district. Designed by Ohio Department of Highways, it provides for four-lane divided pavement, three highway grade separations at interchanges, five railroad bridges over freeway and one highway bridge over a railroad. Construction cost is estimated to be $4,865,000, of which about $750,000 is already under contract as a currently necessary project.

tors' hands apparently is adequate and will not be a bottleneck.

Post-War Projects—Plans under way or completed by the states for post-war highway construction involve improvement and relocation of existing facilities and creation of new accommodations. Some of the plans incorporate novel features and departures from precedent. Accompanying illustrations show a few of the interesting projects planned in various parts of the country.

Comments by Highway Departments

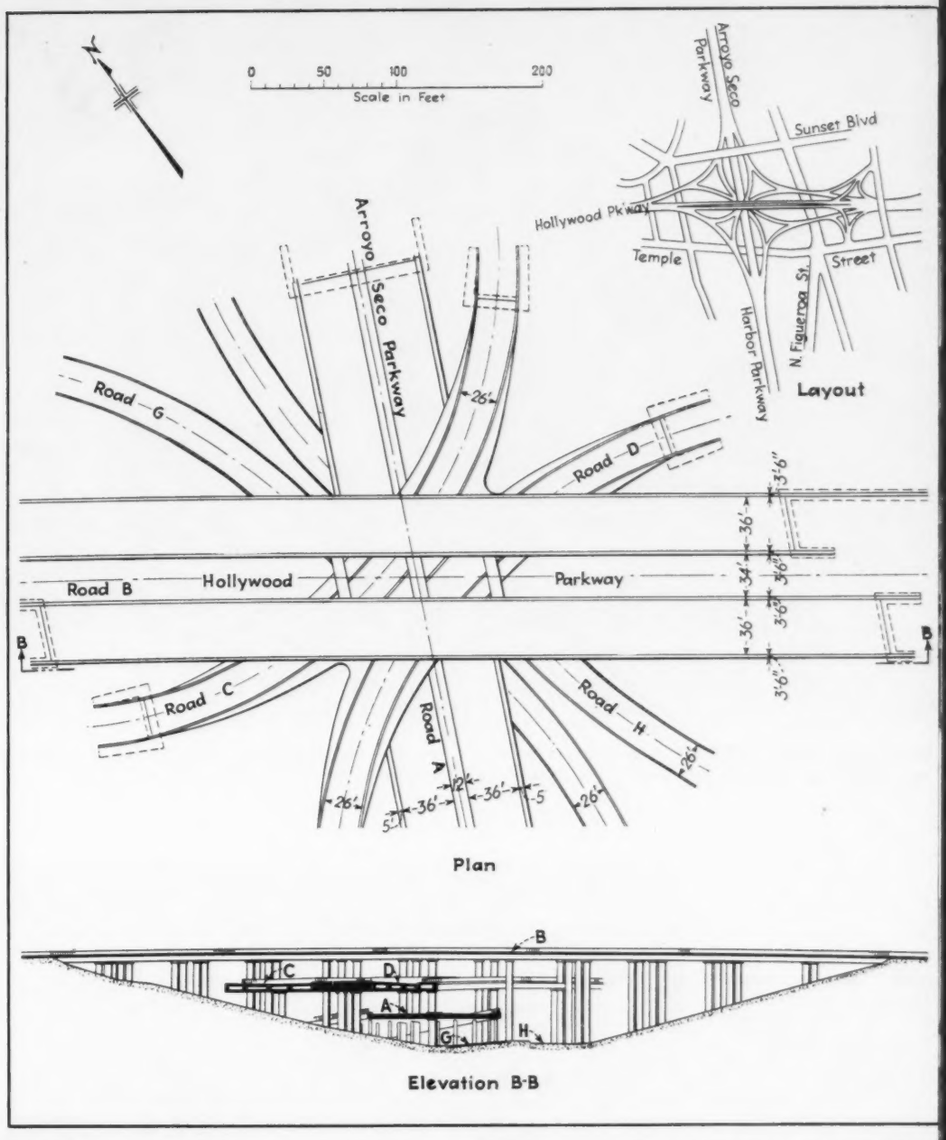
Comments received in connection with the questionnaire from a number of state highway departments are pertinent to this summary of the status of post-war programs.

Arizona: Assuming men, equipment and materials were available, we could probably handle $1,000,000 a month for the first three months. (As Arizona is reliably reported to have nearly $7,000,000 of completed plans and specifications for post-war projects, the estimated rate of advertising new work may be called conservative.—Ed.)

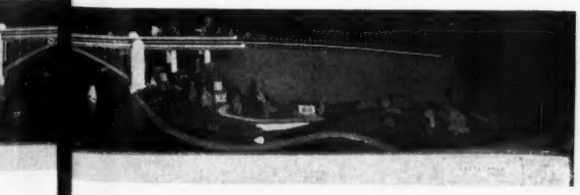
California: As of December 4, 1944, the Division of Highways had plans and specifications completed for approximately $58,000,000 of post-war highway projects. The above figures (in the table —Ed.) are limited by the amount of work which could practically be advertised in such short periods.—*G. T. McCoy, state highway engineer.*

Colorado: By Dec. 1, 1945, the state

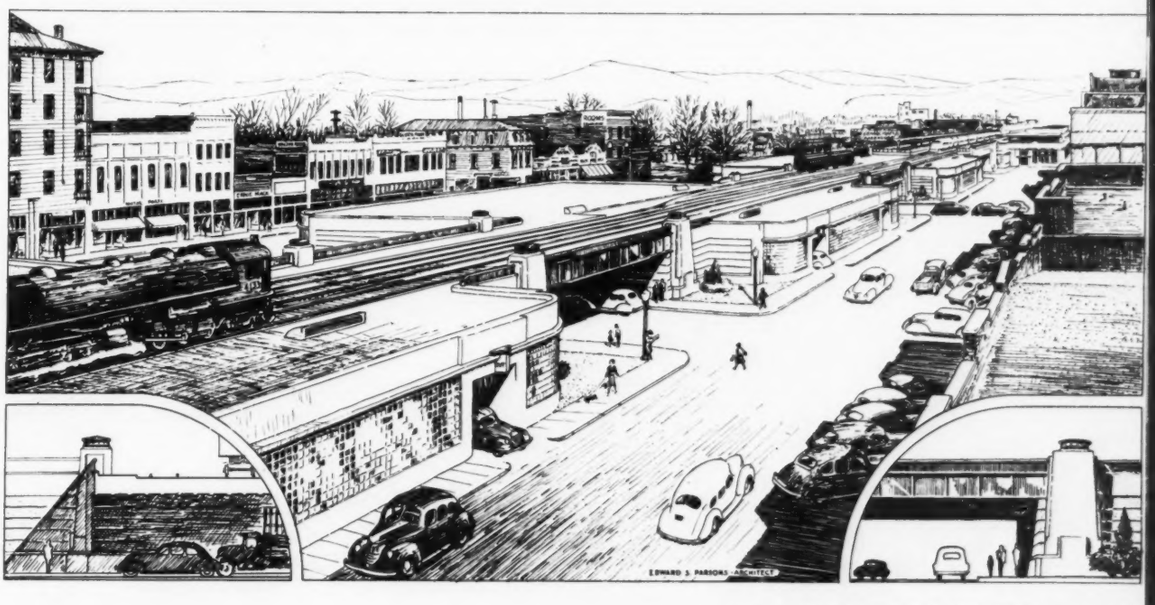
(Continued on page 134)

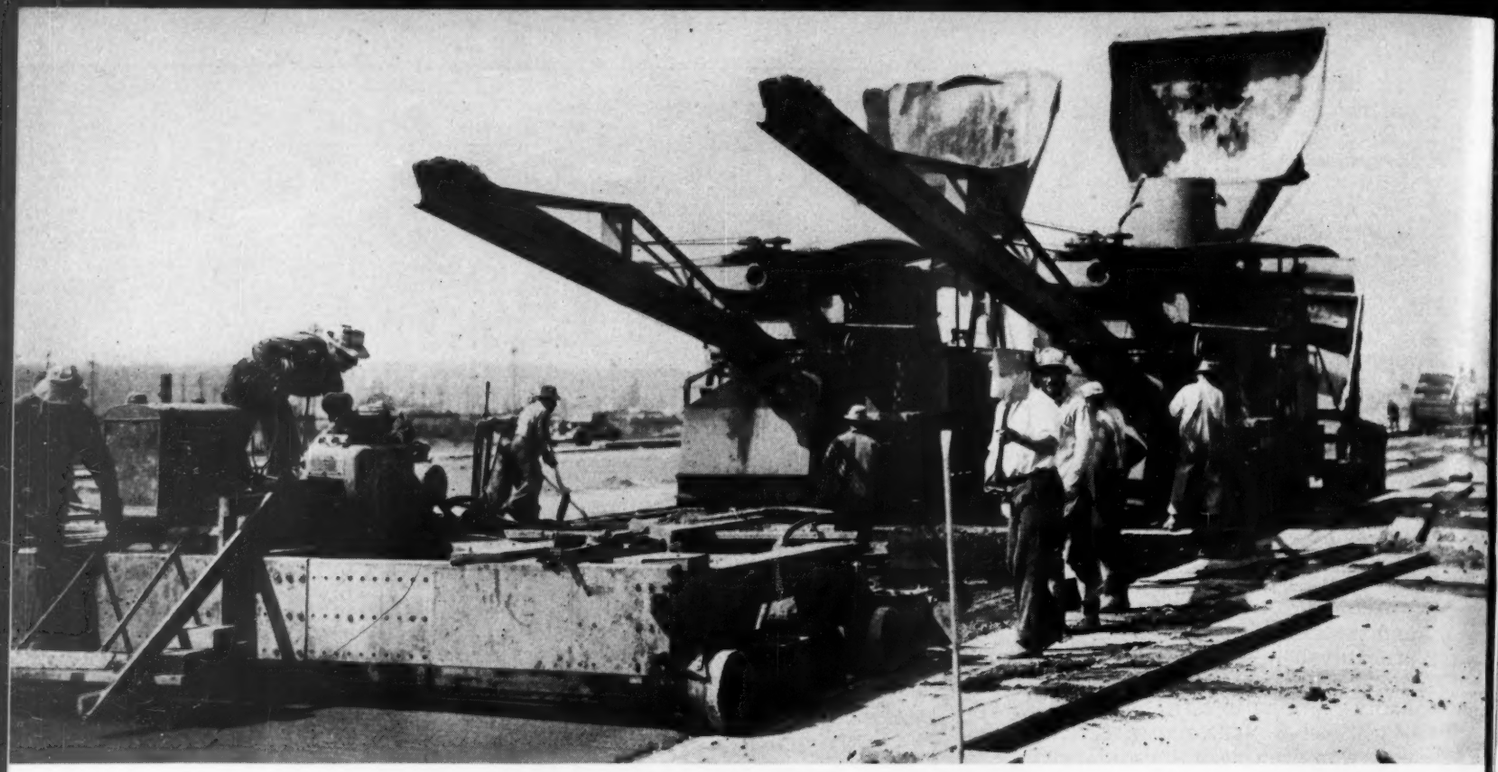


FOUR-LEVEL STRUCTURE in reinforced concrete, for which plans have been completed by California Division of Highways, is chosen in place of conventional clover-leaf to meet traffic requirements involved in interchange between Hollywood Parkway and Harbor-Arroyo Seco Parkway in Los Angeles. Outstanding among state's post-war projects four-level unit is expected to take about one year for construction and to cost about $1,270,000, as part of freeway program for city.

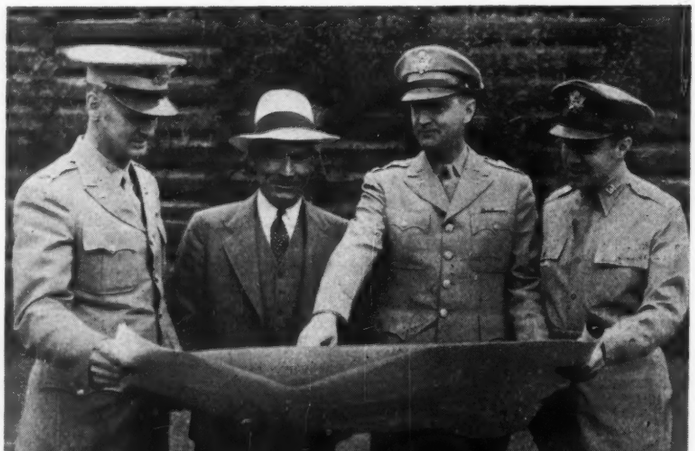


GRADE SEPARATION PROJECT (right), designed for construction in Reno by Nevada State Department of Highways has total length of 9,500 ft., of which 4,080 ft. is on structure separating nine city street crossings. Structure will be reinforced concrete with exception of street crossings, which will be steel. Cost is estimated at $2,181,000 and construction time at 18 months. Preliminary work is more than 90 percent complete, and highway department expects to have plans completed and all details settled with both railroad company and city by end of March.





CONCRETE PLACEMENT for airport improvement is speeded by using two Koehring 34E dual-drum pavers working as team on runway extension, aprons and taxiways. Pavers are closely followed by Jaeger-Lakewood finishing machine.



DIRECTING CONSTRUCTION (right) at Boeing Field is COL. CONRAD P. HARDY, (left) U. S. District Engineer at Seattle, here seen in conference with N. FIORITO, contractor, LT. COL. GEORGE M. SUGDEN, Army Air Forces resident representative and MAJOR LEONARD BINDON, acting chief of operations.

Runways

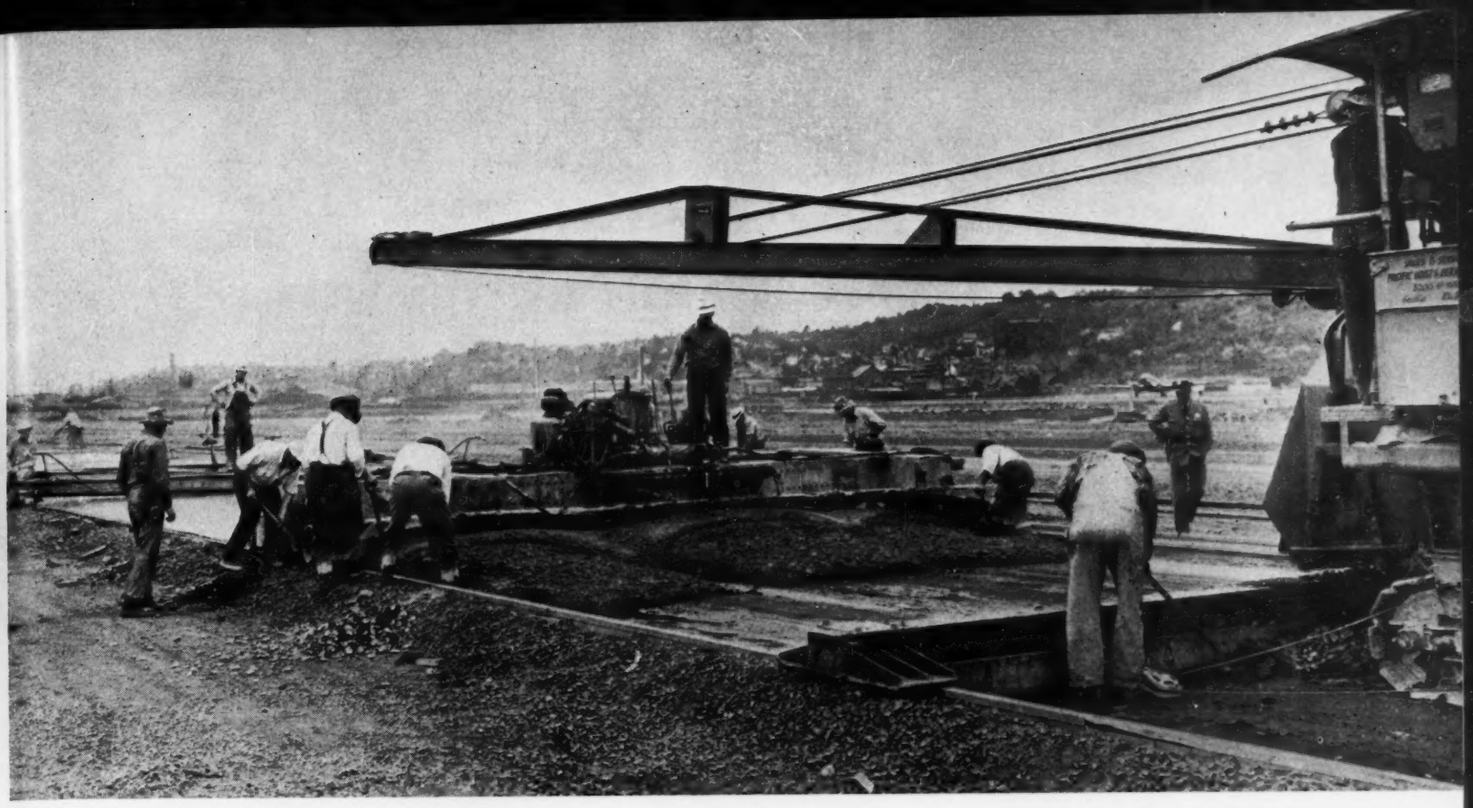
At Boeing Field

Paved with Concrete in

25-Ft.-Wide Slabs

With Thickened Edges

RUNWAY STRIPS (below) are concreted in alternate 25-ft. widths between wood "ribbons" or forms. Slabs are 8 in. thick and have edges thickened to 12 in.



FINISHING MACHINE. Jaeger-Lakewood unit with vibrating attachments, spreads and levels off concrete for 8-in. slab deposited on subgrade by Koehring dual-drum paving mixer which tows screed to level subgrade.

...nd Aprons

BEARING TEST of fill at airport is made by truck-trailer hauling load of 80,000 lb.

CONSTRUCTION OF IMPROVEMENTS at Boeing Field, Seattle, Wash., was initiated July 4, 1944, by the Seattle District U. S. Army Engineers and its contractor, N. Fiorito Co., the basic contract calling for an expenditure of $1,644,658. The improvements, designed to increase the field's facilities to handle the increased output of B-29 planes from the Boeing Aircraft Co., include new parking aprons and taxiways, extension of a runway, construction of a perimeter road, drainage system, installation of floodlights and removal of certain bomb shelters and camouflaged revetments.

On Sept. 15, the project was 25 percent complete; on Dec. 1, it was approximately 80 percent complete; completion of the entire project is anticipated as of February 15, 1945.

Operations have proceeded on schedule, using standard paving procedures, the contractor working one 8-hr. shift. Construction operations were conducted without interfering with plane traffic and as the work involves all areas of the field, careful routing of construction traffic was necessary. The principal difficulty encountered in grading operations was the

(Continued on page 151)

IN TRENCH excavated by dragline (below) 36-in. precast concrete pipe is laid to drain airport.

Step-by-Step Field Methods

Earth Roadbed Waterproofed

By Stabilizing Agent of Treated Resin

And Chemicals Mixed in Place as Dry Powder

1 75-POUND BAGS of Stabinol are unloaded from truck and placed along road at 3-ft. intervals.

EARTH ROADBED STABILIZATION with a water-repellent mix of specially treated resin and other chemicals in the form of a dry powder, a product of the Hercules Powder Co. known as Stabinol, has been applied to a ½-mi. test section of 22-ft. wide road near Farmville, Va. The waterproofing agent was spread over the road surface in a uniform layer and then thoroughly incorporated in the soil to a depth of 6 in. by mixed-in-place methods and equipment. After being properly shaped and compacted the surface of one-half (11 ft.) the width of the road was treated with tar, sand and stone chips. The other half was not surfaced in order to afford evidence of the traffic-resisting qualities of the waterproofed, stabilized soil during the winter months.

Since it was first put on the market in 1940 Stabinol has been produced almost entirely for the Army and Navy. It is designed to make soil waterproof by preventing the penetration of surface water or the capillary rise of moisture from below. The small percentage of this material which was not designated for military use has been used in the construction of highway bases, landing strips for municipal airports and in storage yards. Virginia, Georgia, Ohio, Maryland and Illinois have used it for stabilizing roadbeds.

Before work was started on the Farmville road job, samples of the soil were tested at the Hercules soils laboratory in Wilmington, Del., to determine the correct proportions of the water-repellent powder to be used. Analysis showed the soil to be a heavy, red brown clay with a high mica content, which falls in the A5-A7 classification by the Public Roads Administration standards.

The tests showed that every square yard of road soil would need 10 lb. of

2 WORKMEN OPEN BAGS at one end drag them over ground (below), leaving ½ in. layer of water-repellent agent evenly distributed.

3 GROUND IS SCARIFIED by tractor (below) pulling steel-tooth harrow before mixing of soil is begun

4 **PRELIMINARY MIXING** is done with 20-disk 10-ft. disk harrow (left) and two tractor-drawn spring-tooth harrows (right).

Stabinol, which was delivered in 75-lb. bags, spotted along the road at 3-ft. intervals and then spread by hand, instead of using a mechanical spreader, as illustrated. A uniform layer was spread over the road and was then scarified with a steel-tooth scarifier pulled by a tractor. This operation was carried on until the road had been thoroughly broken up. Preliminary mixing was done with a 10-ft. disk harrow and two spring-tooth harrows.

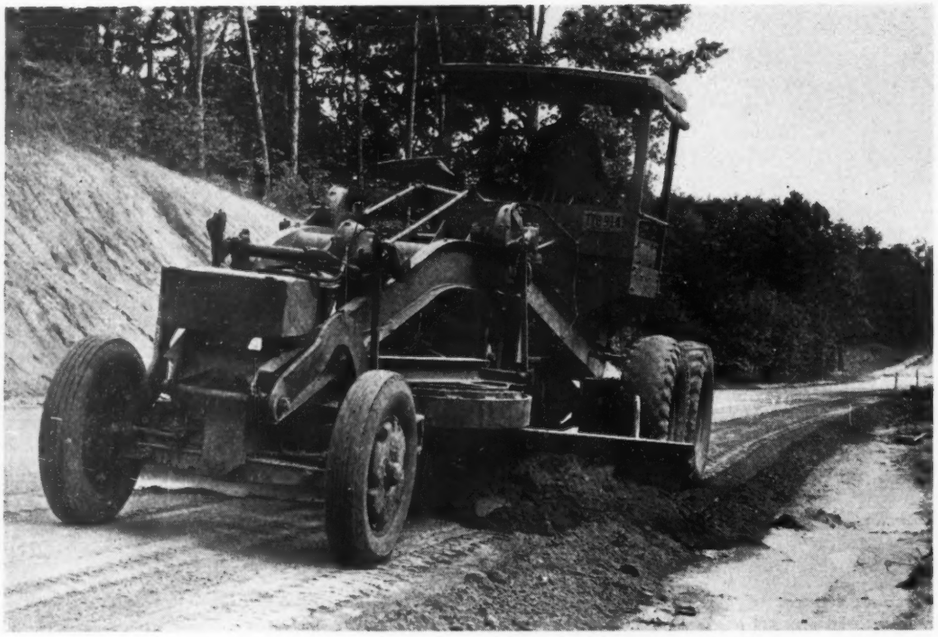
Mixing Methods

Preliminary mixing was followed by a triple-blade turn plow which turned the bottom up for final mixing. Final mixing was accomplished with a tractor-drawn rotary mixer, and this part of the process was continued until 90 percent of the

5 **LARGE PIECES OF SOIL** are broken up by Seaman pulvi-mixer. Small teeth of machine pick up earth and fling it against steel plate as part of pulverizing process.

6 **THREE-BLADE TURN PLOW** (below) brings up soil from bottom for final mixing.

7 SHEEPSFOOT ROLLER is used to "walk out" base to about ½ in of surface. Then spike-tooth harrow is used to break up compaction planes. Water from distributor truck has been applied to bring moisture up to optimum, since road dries out too much for proper compaction during mixing. After mixing water into soil, proper density is obtained by rolling with sheepsfoot roller.



8 MOTOR PATROL GRADER is used to level off top of road and to mark its outside limits. Roadway is shaped by this grader both before and after rolling.

road material would pass through a No. 4 sieve. After final mixing of the material, the road was shaped with a motor patrol grader, and this was followed by a spring-tooth harrow to loosen the soil which had been compacted by the wheels of the grader. The base then was rolled out with a sheepsfoot roller until the feet had "walked-out" the base to about ½ in. of the surface. A spike-tooth harrow was used to break up compaction planes.

Moisture Control

During the mixing, the road dried out too much for proper compaction, and it was necessary to apply water from a distributor truck to bring the moisture up to optimum. After mixing the water into the soil, proper density was obtained by rolling with the sheepsfoot roller, and the road was again shaped with a motor grader. A wobble-wheel roller was used to finish off the Stabinol base. When the base had dried out to about 60 percent optimum moisture, one-half of the road was surfaced with tar, using 0.3 gal. of RT4 per sq. yd., then a thin coat of sand, another priming coat of RT4 and 40 lb. per sq. yd. of No. 12 stone chips. The test section of highway replaces a small county road connecting a county and state highway.

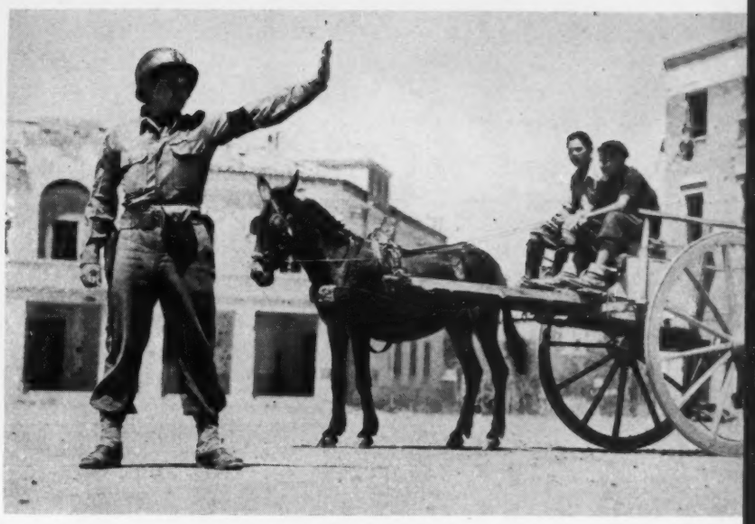
Engineering Personnel

The project was under the supervision of C. F. Mullen, chief highway engineer; Shreve Clark, testing engineer; K. G. McWane, division engineer; and W. W. Nickles, resident engineer, Virginia State Highway Department, with W. H. Burnside representing the Hercules Powder Co. Evart Mayfield supervises the Hercules company's field engineers who are trained to handle stabilizing problems that arise in the field, while the soils laboratory work is directed by Charles F. Moss.

9 WOBBLE-WHEEL ROLLER (below) is used to knead and finish off stabilized base.

10 FINISHED BASE (below), after road has been graded and wet down, is ready to be primed and finished off with hot asphalt and stone chips. Then surface will be rolled with smooth-wheel roller.

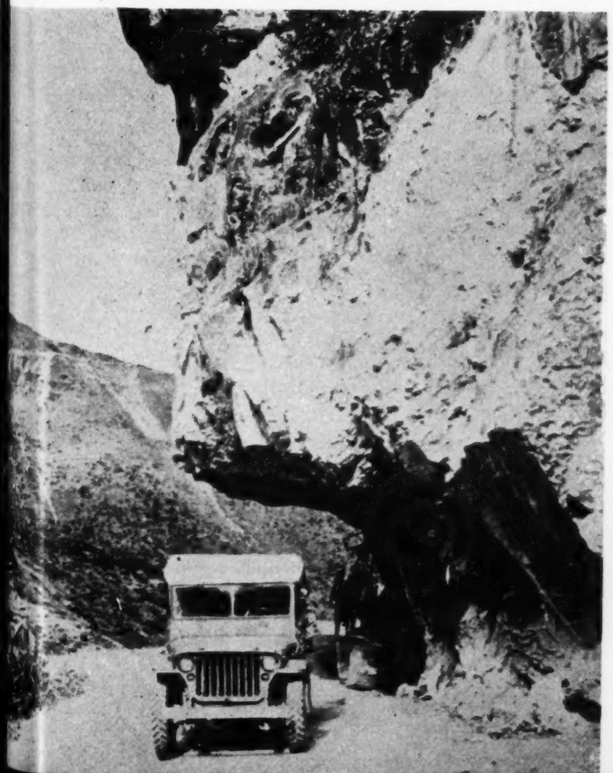
JOB oddities



DIRECTING TRAFFIC at crossroads in Littoria, Italy, is PRIVATE KRAEMER, M. P., U. S. Army.
U. S. Army Photo

TWENTY-FIVE-POUND SALMON (left) is captured in largest annual salmon run on record in Sacramento River. Mammoth hatchery on Battle Creek and fish traps and racks on Sacramento River were constructed at cost of $2,000,000 by U. S. Bureau of Reclamation to enable fish to pass big dams and reach spawning grounds. From traps salmon travel to Coleman Hatchery in aluminum truck (below) equipped with refrigerated tanks.

LAID IN 1882, this section of Pennsylvania R.R. track (below) near Trenton, N. J., consists of Stevens T-rails, made of iron and weighing 40 lb. per yd. Large stone blocks form base.
American Iron & Steel Institute Photo



ON BURMA ROAD SECTION (left), gouged out from mountain American vehicle begins trip. When reconstruction of this route is completed, supplies can travel overland instead of being flown over Himalaya Mountains.
British Combine Photo

PERFECT BALANCE is achieved by 5-ton steel wrecking ball. Dropped from crane magnet to break up steel slag at Buffalo, N. Y., plant, it came to rest on 2¾x 3¾-in. area.
Wide World Photo

AIR-ENTRAINED CONCRETE in 4-yd. batches, made with portland cement containing an air-entraining agent, flows from discharge gates of truck mixers down swivel chutes which are swung by workmen to spread mixture over half of 25-ft. paving lane. Despite relatively low water content of mix made with slag aggregate, concrete displays plastic, cohesive, workable qualities produced by use of air-entraining cement.

AIRPORT CONSTRUCTION moves rapidly under capable supervision of these two men: JOHN B. SCHULTZ (left), president of John B. Schultz Contracting Co., Inc., and DALE A. LOSEY, resident engineer for Corps of Engineers, U. S. Army. Joint contract is executed by Schultz firm with Dutcher Construction Corp.

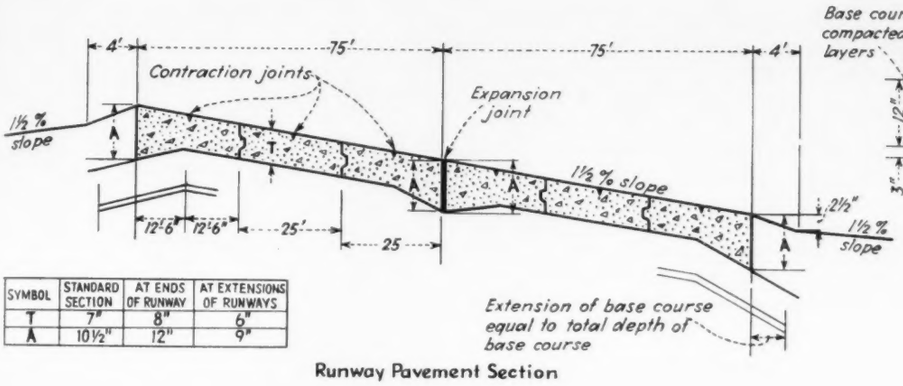
TRUCK MIXERS SUPPLY *Air-Entrained Concrete* FOR AIRPORT RUNWAYS

NORMAL METHOD of spreading concrete in 25-ft. lanes (below) is by backing truck mixers close to edges on both sides of strip. Because loaded 4-yd. truck mixers are not permitted on new slab until it is 28 days old, when concrete is expected to show tensile strength of 700 lb. per sq. in. when broken in beam test, paving operations have to be skillfully scheduled to allow use of adjacent pavement in concreting new lanes.

MIXING AND PLACING air-entrained slag concrete, nine 4-yd. truck mixers hauling up to 2 mi. from a batching plant on the site delivered an average of 500 and a maximum of 650 cu.yd. per 9-hr. day to runways and taxiways on an operating airport at Niagara Falls, N. Y., now being expanded and improved under a contract with the U. S. Army Engineers by the John B. Schultz Contracting Co., Buffalo, and the Dutcher Construction Corp., Baltimore, joint contractors. To avoid delays when transferring concrete operations from one paving lane to another, the contractors rented two complete sets of finishing and joint machines for the job. Thus equipped, the organization was able to complete 159,000 sq. yd. of concrete pavement, requiring a volume of nearly 31,000

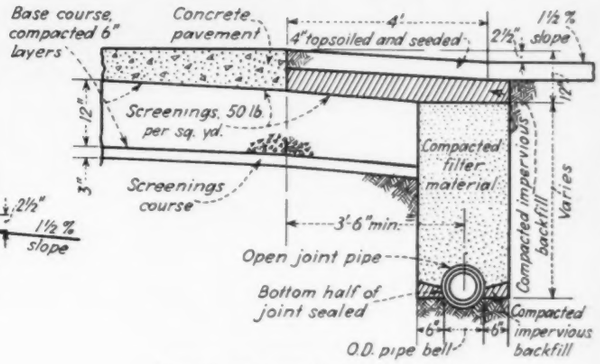
PLASTIC QUALITY of air-entrained concrete is indicated by corrugated appearance of pavement surface behind second screed of finishing machine on first pass of this unit. Slab surface is completely free of water and laitance.

PAIR OF WAGON DRILLS operated by air from diesel-powered 550-cfm. compressor sink blast holes in rock section of diversion channel.



SYMBOL	STANDARD SECTION	AT ENDS OF RUNWAY	AT EXTENSIONS OF RUNWAYS
T	7"	8"	6"
A	10½"	12"	9"

Runway Pavement Section



Section Through Longitudinal Drain

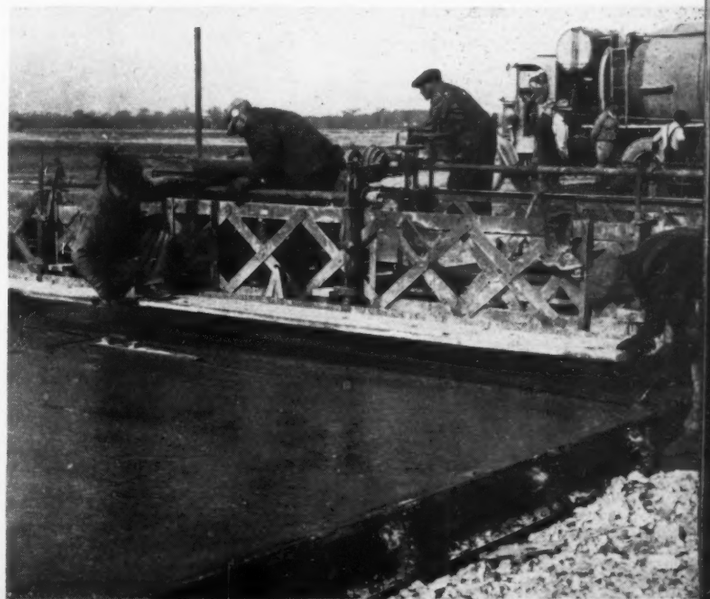
THREE PAVEMENT SECTIONS, indicated by table of dimensions at left, provide for different service loadings. Pavement is placed in 25-ft. lanes, with keyed construction joints between them, except for ¾-in. plain expansion joint on center line of runway. Each paving lane has a longitudinal contraction joint in center of pavement and transverse contraction joints at 15-ft. spacing. These dummy joints, 1¾ in. deep by ¼ in. wide at bottom and ⅜ in. wide at top, are filled with hot asphalt sealing material. In lanes having thickened edges, transverse tiebars of ⅝-in. round deformed steel 30 in. long are installed at 2½-ft. intervals 3½ in. below pavement surface across center-line of lane. Subdrains like that illustrated at right are placed at lower edge of most of runway and taxiway pavement, totaling 13,170 ft. in length, constructed under present airport contract. Pavements of heaviest and intermediate sections are laid on 15-in. slag base shown; lightest section rests on 6-in. slag base.

cu.yd., well ahead of Dec. 1, the completion date originally stipulated by the contract signed on July 14, 1944.

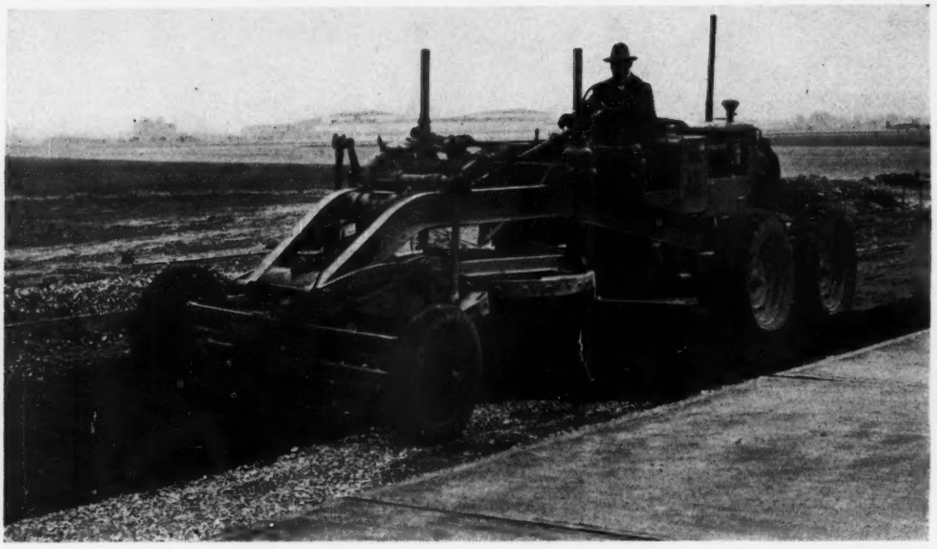
Another item in the improvement of the airport later caused an extension of the contract time. Relocation of a creek channel which formerly bisected the field necessitated the excavation of an unexpectedly large quantity of rock, estimated at about 33,000 cu.yd., and the completion date for paving and grading was moved ahead to Dec. 31 to allow more time for this difficult excavation. The new channel calls also for removal of about 155,000 cu.yd. of earth, and airfield grading involved about 50,000 cu.yd. of earthmoving. Other items in the contract included nearly 5 mi. of drainage pipe, 8-in. to 60-in. dia., almost 3 mi. of electric ducts, incased in 250

TRANSIT-MIX OPERATION is managed for Cooney Bros. by **WALTER P. McCANN**, superintendent (below).

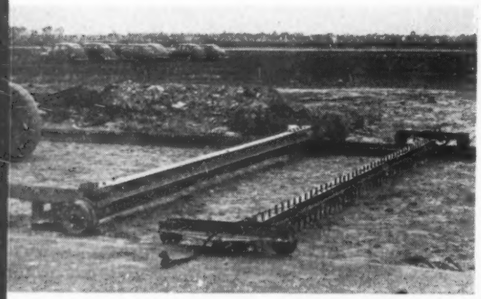
TRANSVERSE DUMMY CONTRACTION JOINT (below) is filled temporarily with steel mold strips from rear of joint machine after slot has been cut by manually controlled blade on machine.



TRANSVERSE TIEBARS installed across centerline of paving lane adjacent to thickened edge are pressed into position 3½ in. below surface of fresh concrete by means of special tool with forked feet at lower ends of vertical members, here pushed down into concrete by workmen on front of joint machine.



DIESEL PATROL GRADER strikes off windrowed slag screenings for surface course averaging 60 lb. per sq. yd. on top of coarse slag base.



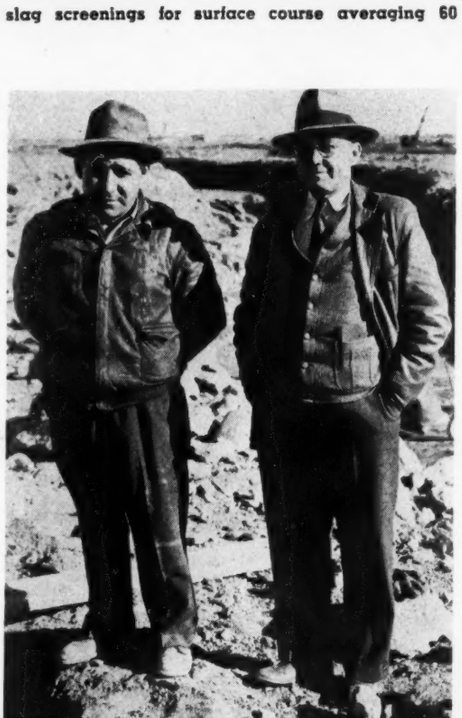
PAIR OF SUBGRADE TEMPLATES checks profile of screening course after material has been spread.

cu.yd. of concrete, and an additional quantity of 550 cu.yd. of concrete for extension of a 5x12-ft. box culvert and construction of 90 manholes and catch-basins on the drainage system. Final dressing of intermediate areas, calling for 85 acres of 4-in. topsoiling and seeding, need not be completed until June 1, 1945. With additions for rock excavation and other items, the total value of the contract comes close to $1,000,000.

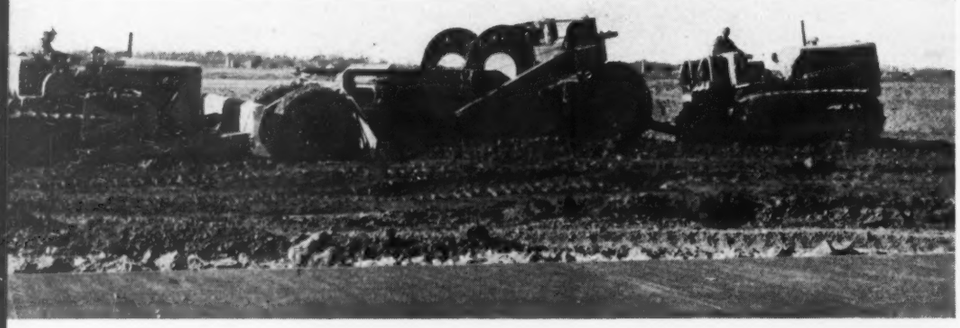
Pavement Design

As indicated by an accompanying cross-section drawing, runway pavement was designed in three thicknesses in accordance with the service which each runway is to render. All the concrete pavement, for both runways and taxiways, rests on a slag base which provides a drainage course above the impervious clay soil of the site. Alongside most of the new pavement is placed a buried edge drain, shown by a section in the same drawing, to collect and carry away any drainage from the pervious base course.

Runway pavements 150 ft. wide are

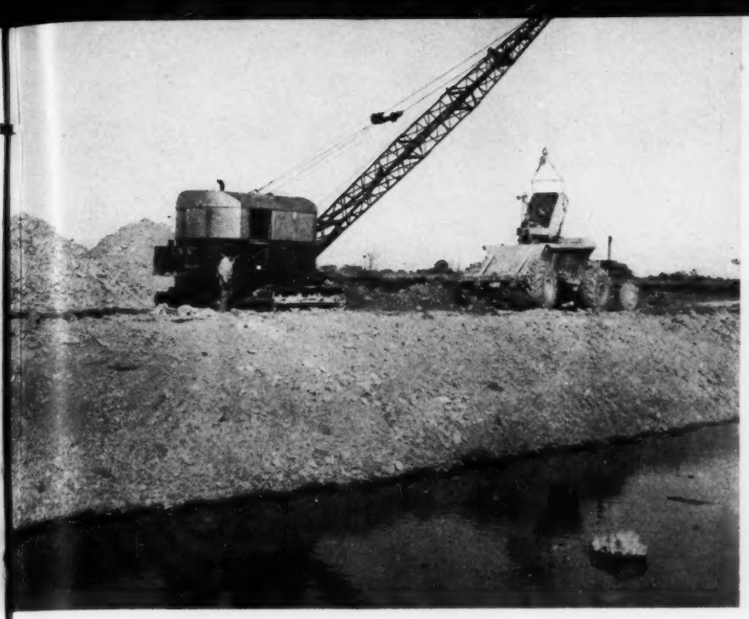


ROCK EXCAVATION for stream diversion is moved by Fago Construction Co. under direction of DOMENIC S. FAGO, standing here with resident engineer, DALE A. LOSEY.



18-YD. SCRAPER receives boost from 70-hp. tractor-bulldozer as unit picks up load in grading runway shoulder. Runways 150 ft. in width are flanked by compacted shoulders 75 ft. wide.

WITH AID OF PUSHER TRACTOR (left), pneumatic-tired tractor-scraper unit loads 8-yd. bowl with topsoil from stockpile for quick trip to area being treated.



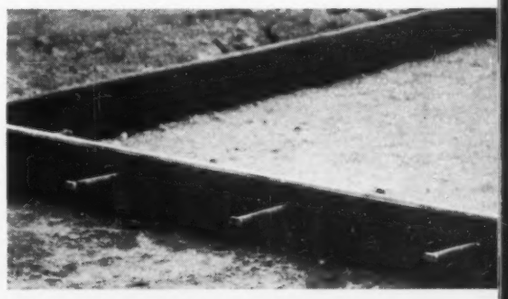
1½-YD. DRAGLINE excavates diversion channel in earth section and loads spoil into 15-yd. diesel-powered tractor-wagon unit. Channel has bottom width of 30 ft. and side slopes in earth of 1 in 2.

BATCHING PLANT equipped to weigh batches up to 5-yd. volume is able to load a truck mixer a minute. Bin unit comprises four 25-yd. compartments for aggregate and 200-bbl. center compartment for bulk cement, delivered from receiving hopper by electric-motor-driven screw and elevator. Working on elevated track about 6 ft. above ground level, 1½-yd. clamshell crane with 60-ft. boom keeps bins filled with aggregate out of stockpiles to take care of concrete output running up to 75 cu. yd. per hour on this job.

separated into two 75-ft. paving units by a center-line expansion joint ¾ in. wide. A new runway 5,500 ft. long by 150 ft. wide comprises the largest single area of pavement placed under the present contract. Designed for the heaviest plane loads, this pavement has a 10½-7-7-10½-in. section, except for two portions 300 and 360 ft. long at the ends of the runway, where the depth is increased to 12-8-8-12 in. Under the pavement is a base of the type shown in the section drawing of the longitudinal drain: a 3-in. blanket course of slag screenings; 12 in. of mill-run slag, graded 4-in. to No. 4 screen, compacted in 6-in. layers; and a 60-lb. application of slag screenings spread and rolled into the coarse slag to form a tight subgrade for the concrete.

Other runway pavement of lighter section was placed in extensions 670 and 1,140 ft. long of two existing runways 150 ft. wide. The directive for present expansion of the airport laid down the rule that these extensions should be given a pavement comparable to the existing pavement on the runways, which had been paved about two years ago with 2 in. of hot asphaltic concrete on a 7-in. dry macadam base. For the extensions, the designers of the present slab selected 9-6-6-9-in. concrete on a

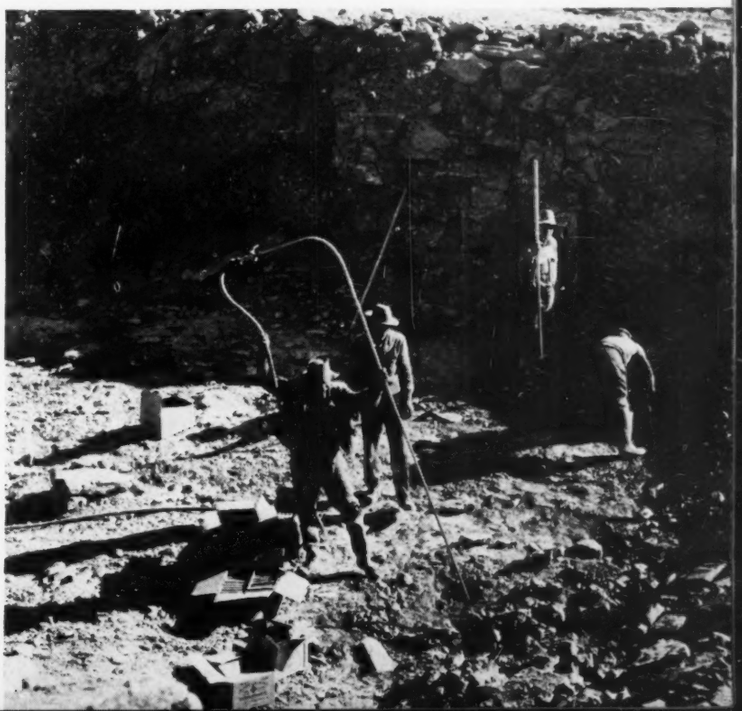
(Continued on page 154)



SPADE-TYPE SUPPORTING UNIT for expansion joint comprises stem section which becomes anchored in one slab and spade section which extends into opposite slab at base of pavement. Metal cover over latter part forms pocket which permits movement of spade support as concrete expands and contracts.

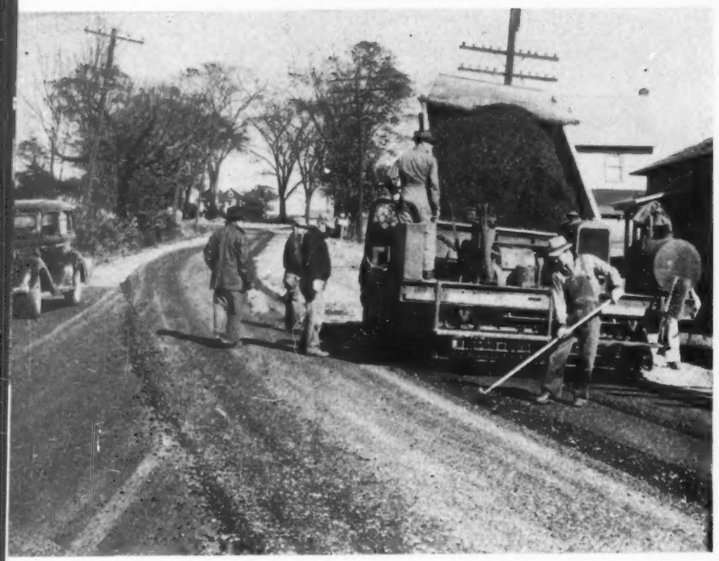
EDGE DRAIN of 8-in. concrete pipe (below) is laid with upper half of joints open in trench at lower side of 50-ft. taxiway, on which slag base has been placed in preparation for paving second 25-ft. lane. Pipe trench is backfilled with pervious slag to admit drainage from pavement base.

BLAST HOLES (below) are cleaned by blowing preparatory to loading with 40 percent dynamite. Gelatine dynamite is used in wet holes, and ammonia type in dry holes.



Bituminous Resurfacing

Improves 250 Miles of New York State Highway



BITUMINOUS PAVING MACHINE, pushing truck ahead as end-dump body discharges load into hopper, distributes uniformly and strikes off to grade cold-laid asphalt mixture for binder course on second 10-ft. lane over old 16-ft. concrete pavement widened to 20 ft. by broken stone edge strips.

EQUIPPED AT THE END OF 1943 with twelve self-propelled bituminous spreading-finishing machines, to which a dozen new units were added during 1944, maintenance forces of the New York State Department of Public Works utilized limited manpower to good advantage between early May and late October of last year to resurface nearly 250 mi. of highways, largely three-lane roads. Bituminous mixtures for each resurfacing project were bought under contract from a commercial plant, after taking bids. Five optional bituminous mixtures were acceptable to the state, and each bidder had the privilege of selecting one or more types on which to offer a price. Four mixtures were produced by patented processes, and one was a non-proprietary, open competitive type.

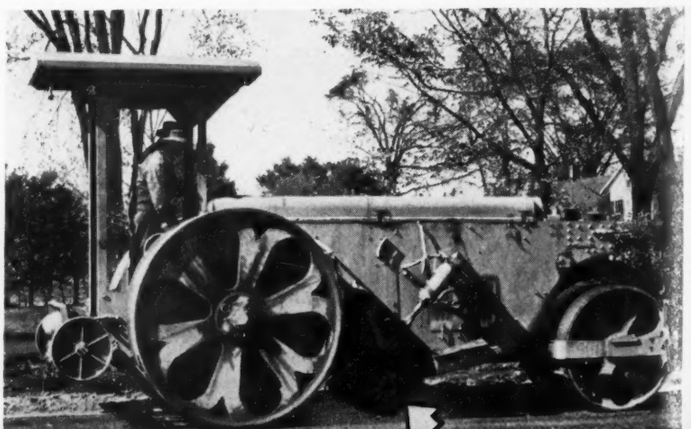
Except for the fact that it was laid on a two-lane road of inferior alignment and width, a resurfacing project by District 1 on Route 396 in South Bethlehem, not far from Albany, may

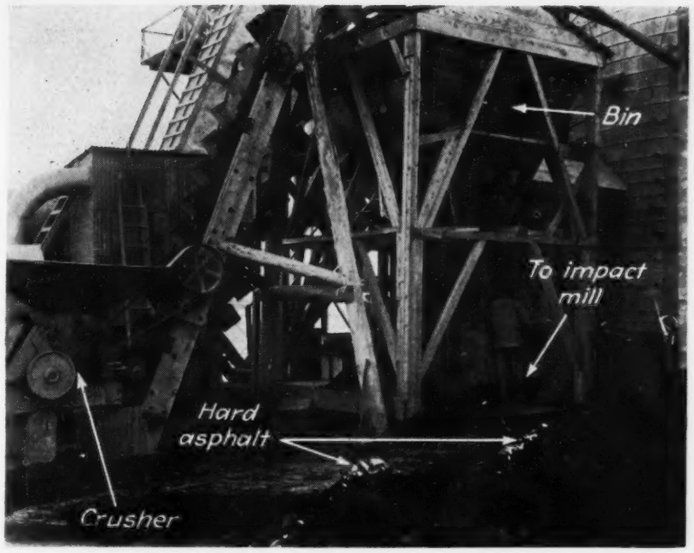
FOLLOWING PAVER, three-wheel 10-ton roller compacts cold-laid asphaltic concrete of both binder and wearing courses.

MAINTENANCE ACTIVITIES of New York State Department of Public Works move forward in accordance with policies established by V. L. OSTRANDER (right), superintendent of operation and maintenance.

INTERMEDIATE ROLL, hydraulically controlled, on 10-ton machine (below) is put into contact with pavement on final rolling of each course. Skillful operator gets results closely approaching perfection on this rolling.

FILLED WITH WATER, single-drum portable roller (left) cooperates with three-wheel 10-ton machine by compressing and ironing each of two cold - mixed, cold - laid courses in tight places.





HARD ASPHALT to be combined with flux oil in mixing process is broken in crusher before being elevated to bin from which it is fed to impact mill to be pulverized.

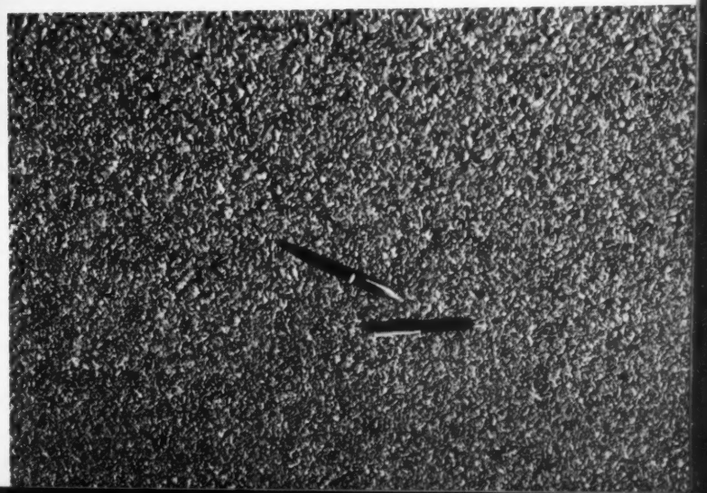
be cited as representative. The job involved widening to 20 ft. an old 16-ft. concrete pavement of 7-6-7-in. cross-section before resurfacing to full width. Colprovia cold-mixed, cold-laid asphaltic paving material was furnished to this job by the Callanan Road Improvement Co., South Bethlehem, from a plant in nearby Feura Bush which had just finished supplying a non-proprietary mixture, designated Type 3, widely and successfully used in New York State, to a resurfacing project on three-lane U.S. 9 in Loudonville, between Albany and Saratoga Springs. A photograph shows the latter surface after it had been under traffic for a few weeks.

Resurfacing in New York State usually is laid 2¼ to 2½ in. deep, with 1 in. of fine-mix top course on a binder layer of coarse mixture. This treatment calls for about 225 lb. per. sq. yd. of resurfacing material, made up of about 135 lb. of binder and 90 lb. of fine mix. On the South Bethlehem job, a slightly

(Continued on page 126)

ASPHALT MIXING PLANT turns out 1½-ton batch of cold-mixed paving material in 1½ min. Plant delivers material to state maintenance project on average one-way haul of about 3 mi. at $5.75 per ton.

LAYING TWO-COURSE RESURFACING on widened pavement of Route 396 in South Bethlehem. JAMES E. KELLY (left), project engineer, reports satisfactory progress to GEORGE J. DOYLE, superintendent of operation and maintenance for District 1, New York State Department of Public Works, Albany, N. Y.



AFTER THREE WEEKS UNDER TRAFFIC on three-lane U.S. 9 in Loudonville (above), surface of New York State Type 3 wearing surface exhibits gritty, open texture (right) which will close up somewhat more with service, though still retaining coarse, non-skid characteristics. Type 3 is modified Topeka mixture made with asphalt cement and liquefier.

HEAVY EQUIPMENT REPAIR SHOP in basement of division headquarters building at Topeka is subdivided into paint shop, tire storage, and welding shop. Here heavy roadbuilding machinery is repaired or rebuilt.

Repair Shops Keep Kansas Road Equipment Ready for Duty

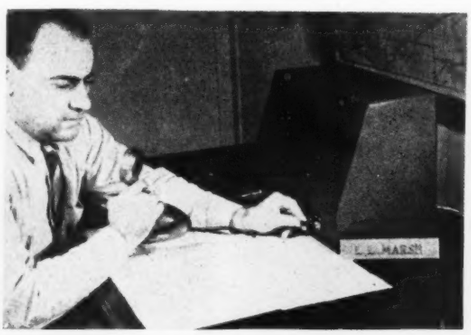
RESPONSIBLE FOR general upkeep and repair of road-building equipment, where continued operation is essential to highway maintenance, the Division 1 shop, located at Topeka, Kans., is typical of six division shops operated by the maintenance department of the Kansas State Highway Commission. Strategically located throughout a state in which highway equipment must meet many emergencies caused by blizzards and floods, each division is adequately staffed with well trained personnel, and tooled for repairing all types of equipment at top speed.

For routine repair and maintenance the divisions are subdivided into four or five districts, each covering the equivalent of four counties. Each district has a well equipped shop for light repairs, staffed by a district clerk and mechanic. The mechanic makes minor running repairs of all equipment in his district, either in his shop or in the field. All equipment requiring major motor overhauls and repairs is immediately reported to the division's chief mechanic and promptly moved to the large division shop for attention.

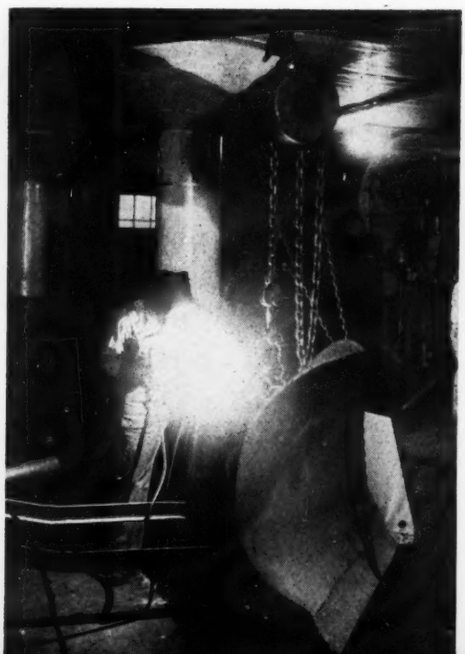
Normally, manufactured parts are used for replacement, but because of present depleted repair stocks and wartime priorities, worn parts are rebuilt in the shops whenever possible. Widely distributed throughout the state, these division and district shops keep more than

MACHINIST AT WORK (below) on a lathe shapes 4 bronze bushings to proper size for use on truck. Bushings had been rough cast at foundry.

TWO-WAY RADIO COMMUNICATION enables L. L. Marsh, state maintenance engineer, to talk with L. J. Siler, assistant state engineer of maintenance, in field. System has proved invaluable when floods, ice or heavy snows obstruct roads.



ARC-WELDER (below) in basement shop mends brace on blade of heavy snow plow.



LIGHT REPAIRS are quickly made in well-tooled department on floor directly above heavy repair shop (above). Floor is subdivided into machine shop, electrical shop, tire and service departments. Mechanic in foreground repairs axle bearings on 6-ton Walter truck used for moving equipment.

2,300 separate pieces of Kansas Highway Commission equipment in first-class operating condition.

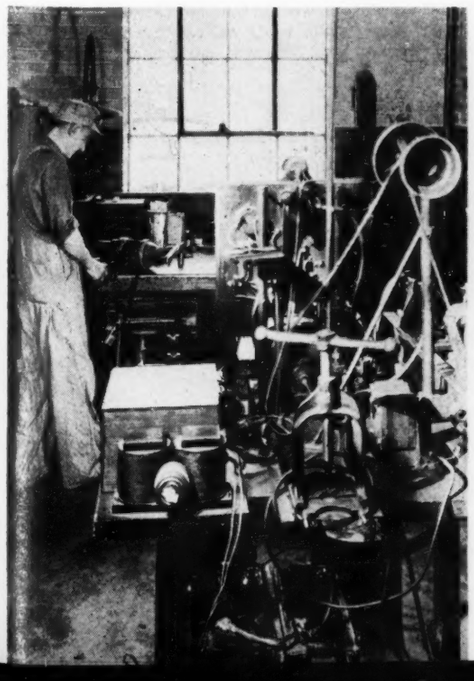
Included in the state's machinery, under the supervision of W. H. Jury, superintendent of equipment, with R. C. McIntire as assistant superintendent of equipment, are the following items: 498 trucks, 177 motor graders, 192 tractors, 380 snow plows, 190 road rollers, 224 mowers, 107 trailers, 21 concrete mixers, 21 boiler and tank car heaters, 65 small and 7 large truck-mounted distributors, 9 rock crushers, 6 power shovels, 5 road oil transports, 5 elevating

(Continued on page 180)

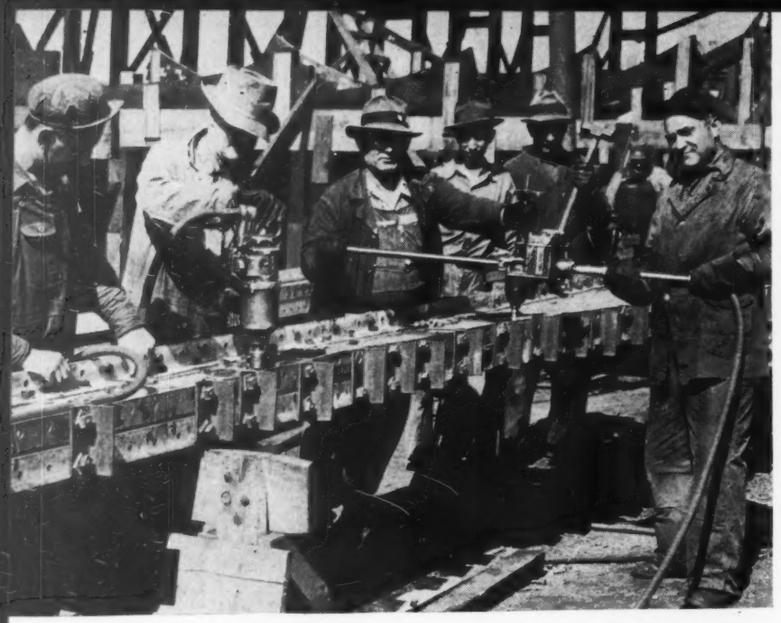
DIVISION HEADQUARTERS BUILDING (right) at Topeka, Kans., contains shops in basement and first floor for keeping heavy equipment in repair.

IN PAINT SHOP (below), Dodge 4-wheel-drive weapon carrier recently purchased from the Army, gets a prime coat of Kansas Highway Department's own Persian red. Painter is using DeVilbiss paint gun with quart container. Carrier, with front winch, will be used by bridge crews in handling materials and as auxiliary to unload materials from boxcars on railroad sidings.

SHORT-WAVE RADIO STATION (below) of 150 watts affords quick two-way communication with maintenance men in field. There are three such stations at division offices throughout state.



IN ELECTRICAL SHOP (left) new switch is installed in handle of Black & Decker drill. Included in electrical repair shop equipment is Allen test bench for magnetos, starters and generators, Eisemann winding tester, Quickway boring bar, Neon tube for condenser testing, Rimac valve spring tester, and valve refacer used for grinding.



HOW They Did It

CONSTRUCTION DETAILS For Superintendents and Foremen

KEEL SECTION OF SHIP is bolted up prior to riveting. Thousands of temporary or service bolts are used to hold assembly in position. Temporary angle clips along sides will be removed after riveting.

American Institute of Bolt, Nut & Rivet Mfrs. Photo

CUTTING CLOSE TO GROUND Disston-Mercury gasoline-driven chain saw fells large diameter tree. Drive is through positive acting multiple disk clutch. Engine is 2-cylinder unit air cooled by fan. Two men operate unit.

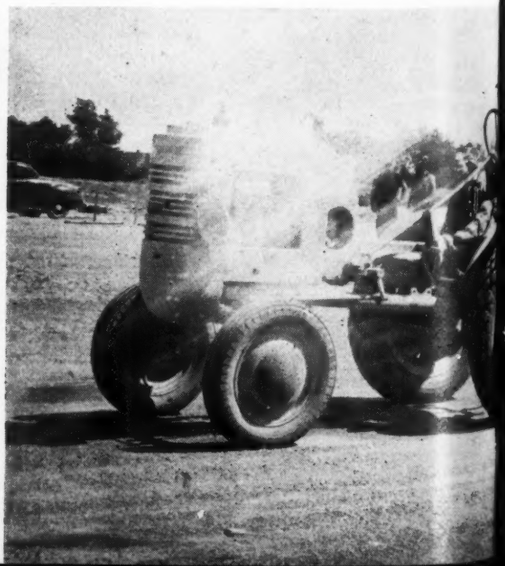
HOLES IN BULKHEAD are cut by Clark 3-blade adjustable hole cutter powered by Ingersoll-Rand drill.

MORTAR CUTTING CHISEL (below) is used in chuck of Stanley portable electric hammer to remove loose mortar between bricks and clean out before repointing joints. Unit, weighing 15½ lb., can drill holes in concrete up to 1⅛ in. dia.

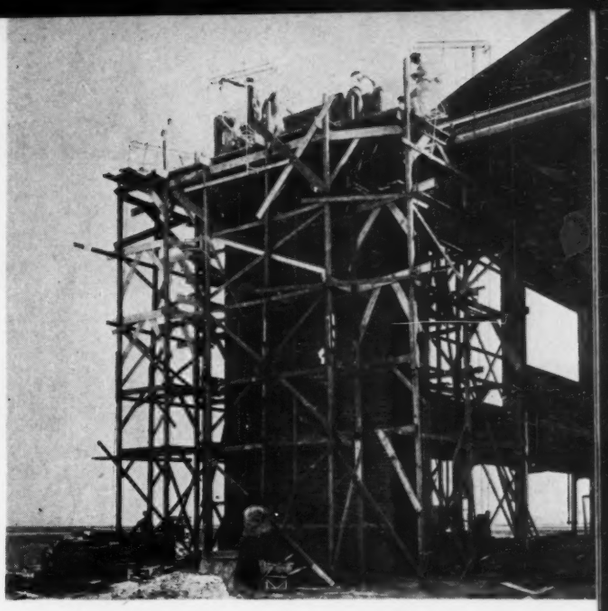
EARPHONE (below) placed in contact with metal rod is used by J. O. FORTIN, water superintendent of Glen Ellyn, Ill., to locate underground leaks in distribution system.

Photo, C. I. Pipe News

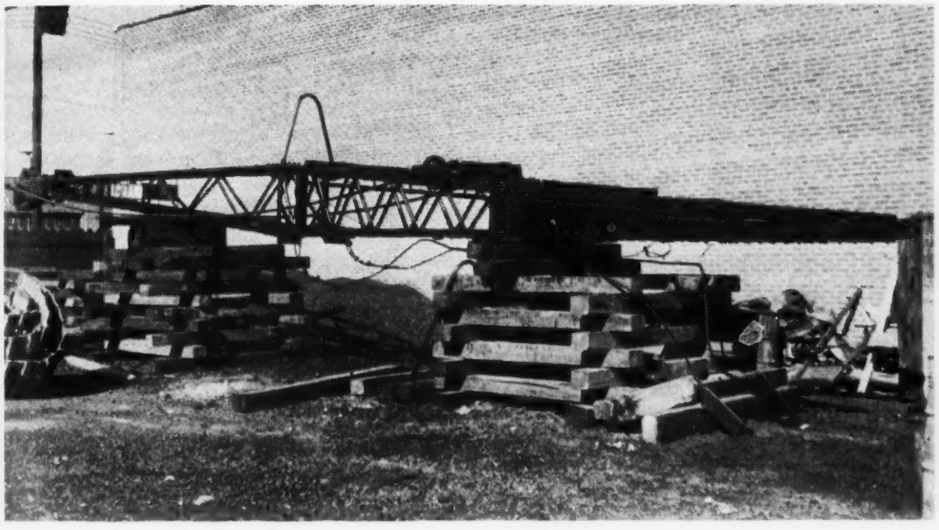
DRY DUST is worked into place by tractor-drawn sweeper to fill voids in upper surface of base for bituminous concrete pavement at Fort Dix, N. J., airfield.



TREADWAY BRIDGE is constructed by U. S. Army engineers in France using Coffing ratchet lever hoist. When used as double chain, this 34-lb. hoist has capacity of 3 tons.

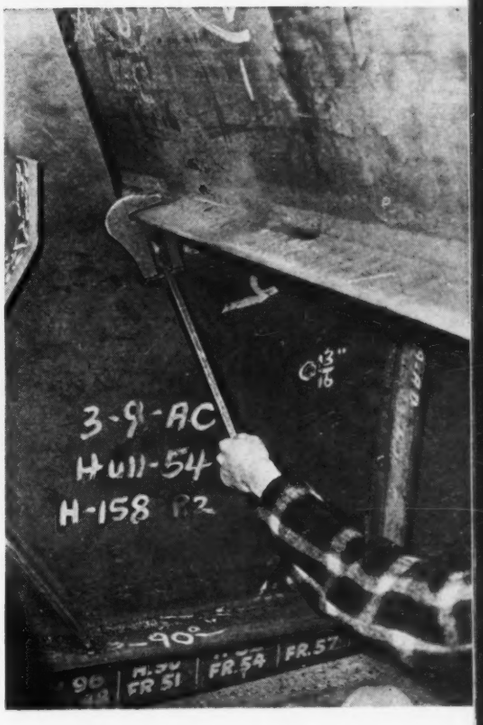


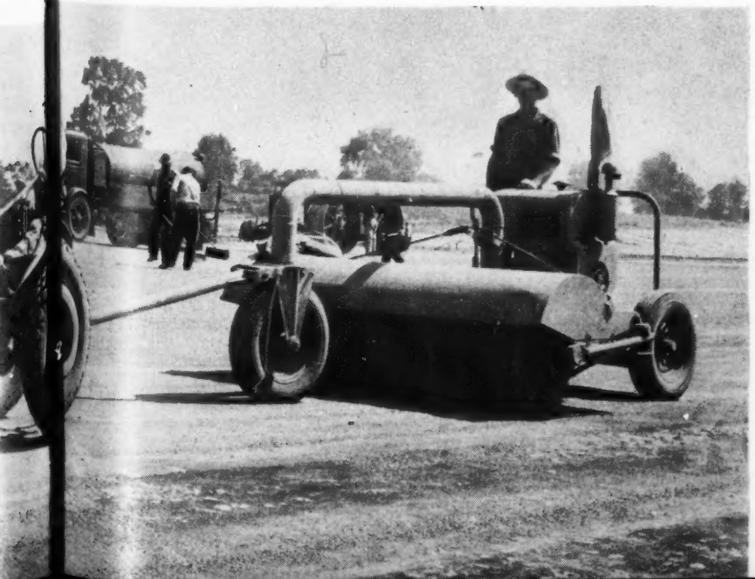
HANGAR IS CONSTRUCTED with aid of Clipper portable hand hoist. One man on ground loads material, hoists it to platform and automatically unloads it. Consisting of two units, hoist weighs 80 lb.



NO JACKS ARE NEEDED to reassemble booms on cranes or shovels at yard of Andrew Gull Corp., Brooklyn, N. Y., where booms when detached are supported on cribbing at exact height for reconnection, keeping them clear of dust and dirt while not in use and saving time in converting machines from one type of service to another.

STEEL IS MOVED without use of crane by means of wrench (right) with head having slotted jaw which fits over steel. Head is movable on long pry bar handle with roller in head under jaw. By placing slotted jaw on horizontal piece of steel and using handle as pry, jaw locks and steel is moved. Device is used at Sausalito, Calif., yards of Marinship Corp. for moving and aligning "longs" in web frames of hulls.





SMOOTHING OF BEVEL, prior to welding, on 24-in. steel tube for 1,265-mi. natural gas pipeline between Texas and West Virginia, is done by special electrically powered grinding tool (right) mounted on spider within pipe and rotated around circumference.

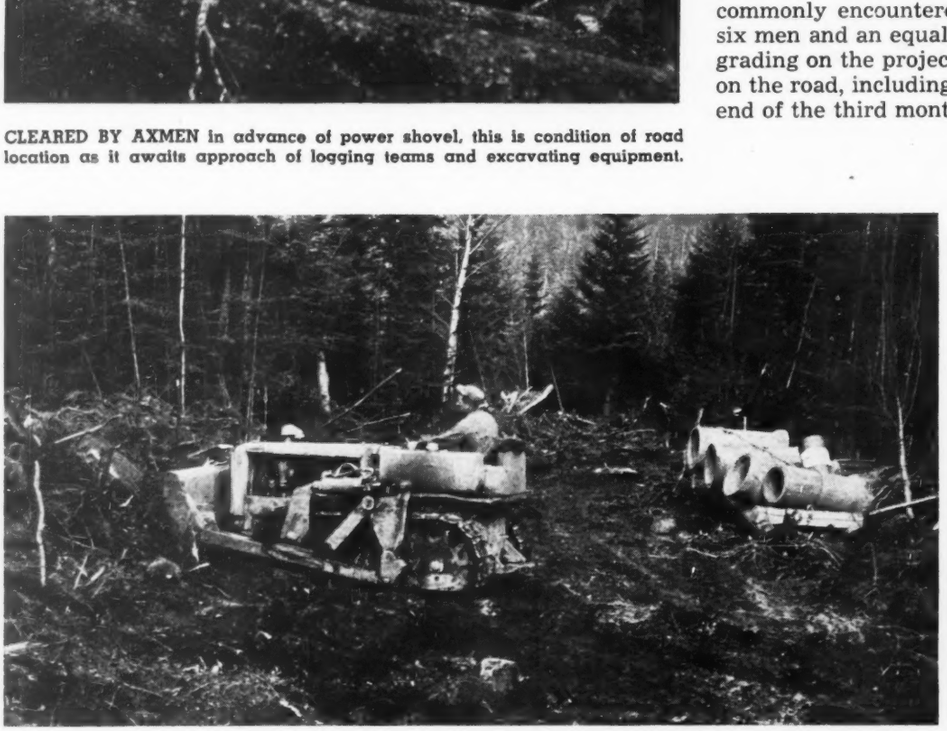
Access Road

Taps Timberland to Relieve Pulpwood Shortage

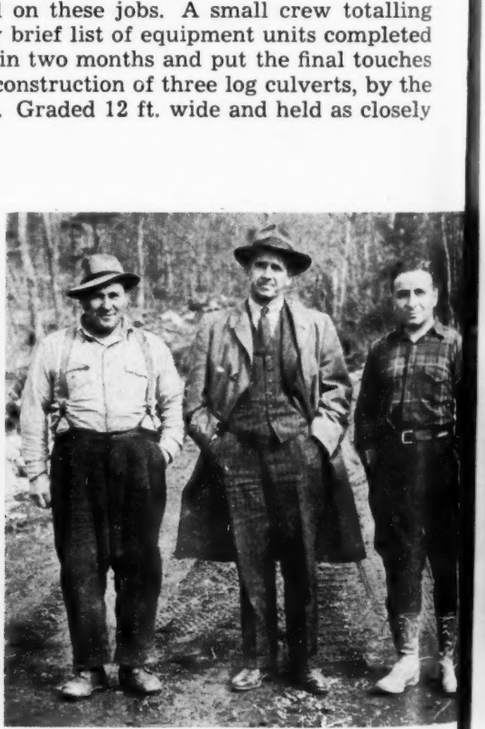
GRUBBING AND DIGGING its way into virgin timber territory, ¾-yd. gasoline shovel builds pioneer road down gentle slope approaching location for proposed new lumber camp on far side of mountain.

CLEARED BY AXMEN in advance of power shovel, this is condition of road location as it awaits approach of logging teams and excavating equipment.

TYPICAL IN MANY RESPECTS of 16 access roads built during 1944 by the New Hampshire State Highway Department as agent for the Public Roads Administration and the War Production Board, to make timberlands or mica mines accessible for operation and thus relieve shortages in two critical materials, a 2-mi. forest project recently completed by Arthur W. Whitcomb, contractor, Keene, N. H., on U. S. National Forest property in rugged mountain terrain near the center of the state, presented natural conditions and obstacles of a kind commonly encountered on these jobs. A small crew totalling six men and an equally brief list of equipment units completed grading on the project in two months and put the final touches on the road, including construction of three log culverts, by the end of the third month. Graded 12 ft. wide and held as closely



BRUSH, STUMPS, BOULDERS AND MUCK move aside as diesel-powered tractor-bulldozer cleans up rough grade for later operation of blade grader. At right is load of 15-in. plain concrete pipe on sled which serves also for transporting gasoline and oil to power shovel and tractor-bulldozer.



ENGINEERING SUPERVISION of project comes under the direction of JOHN O. MORTON, (center), construction engineer, New Hampshire Highway Department, with RICHARD F. TOWNSEND (in plaid shirt) as resident engineer on job. At left is LEONARD A. THIBODEAU, who has charge of all truck roads for lumber company.

PORTABLE COMPRESSOR which furnishes air to hammer drill operated with detachable bits takes care of boulders and rock outcrops along 2-mi. location of access road.

PICKED UP AT REAR by an assist from power shovel, tractor-bulldozer extricates itself from soft muck of small stream which crosses road location at this point.

as possible to grades of 7 percent for loaded uphill hauls and 15 percent for unloaded, the road was paid for by a $16,000 allotment out of National Defense Highway Act funds, about $1,000 for engineering costs and $15,000 for construction costs. It is expected that about 30,000 cords of pulpwood logs will be brought out over the road this winter.

Climbing one side of a mountain above an existing lumber camp and descending the other side to a new camp location, the route meets some topographical conditions which made it necessary in places to exceed the desirable grades of 7 percent loaded and 15 percent unloaded. To permit trucks to pass, turnouts are provided at intervals of about 2,000 ft. or less. The location traverses forest land which required clearing all the way. Axmen for the purpose were hired from the Parker Young Co., of Lincoln, N. H., lumber operator in the national forest.

In general, the soil along the route is a glacial till, or hardpan, with a low silt and clay content. At the starting end of the route, near the existing lumber camp, the silt and clay content was sufficient to make the road extremely soft in wet weather, and this condition was corrected by bringing in bet-

(Continued on page 176)

FINAL SHAPING of road profile is accomplished with this 8-ft. blade grader, hooked up to diesel tractor. Beside machine stands G. ALLEN MOTT, general superintendent for Arthur Whitcomb.

DOWNHILL GRADE FOR LOADED LOGGING TRUCKS on this section of road averages 15 percent but includes some short pitches of 16½ percent. Remnants of broken boulders indicate amount of blasting required on this portion of route. Log landings, or skidways, barely distinguishable in this picture, are already loaded alongside road, waiting for project to be completed.

Pavement Widening

Improves Strategic Highway... Old Bridges Replaced

By R. H. BALDOCK
State Highway Engineer of Oregon

NEW CONCRETE BASE 8 ft. wide is placed by Rex paver alongside old 16-ft. pavement.

THE 77TH CONGRESS, by the Defense Highway Act of 1941, authorized $50,000,000 for the building of portions of the strategic network of highways in the United States. Half of that sum was allotted to the states on a formula basis; the other half was left for allotment at the discretion of the Federal Works Administrator.

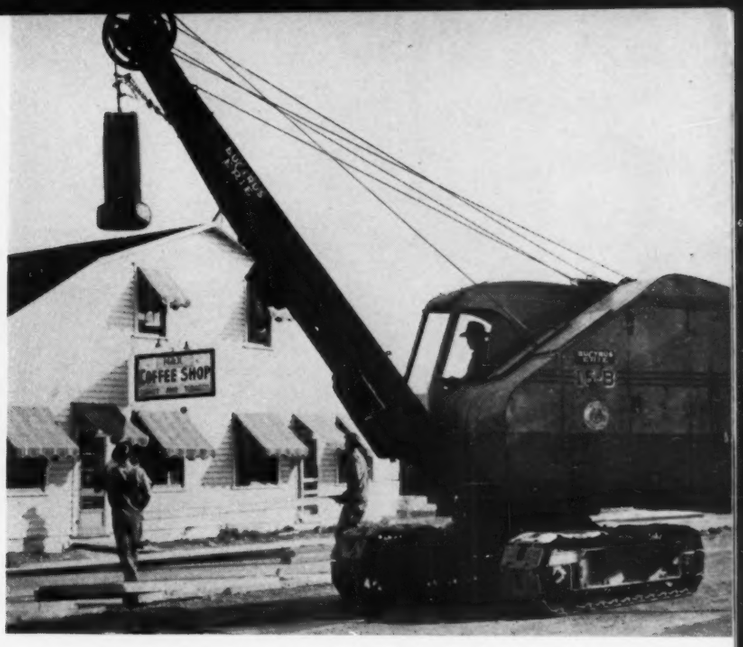
In June, 1944, the Administrator allotted $383,000 of federal funds which was matched with $107,000 of state funds for the widening of the Halsey-Harrisburg section of the Pacific Highway (US99). This section is a portion of the main traffic artery along the Pacific Coast joining the states of Washington, Oregon and California. This construction will remove a narrow, hazardous, bottleneck on this important strategic highway over which a heavy volume of war traffic is carried.

The work, about 50 percent complete at this time, consists of some straightening of the alignment through and just south

EASTERN HALF of new treated-pile trestle bridge of composite type (below) is constructed while traffic is routed over old bridge, at left, which will be removed. Bridge will be 30 ft. wide with 5-ft. sidewalk on each side. Timber stringers are dapped for connection with concrete deck.

ALIGNMENT OF HIGHWAY (below) is straightened south of Halsey, Ore.

R. H. BALDOCK, author of accompanying article, is state highway engineer of Oregon.



OLD CONCRETE PAVEMENT on Pacific Highway is broken up by skull-cracker dropped from boom of Bucyrus-Erie crawler shovel.

of Halsey, midway between Salem and Eugene, and widening of the grade and pavement over the remainder of the 8.8-mi. project. Right-of-way was acquired and the grading work performed for a four-lane pavement, two 24-ft. lanes with a 15-ft. dividing strip. Under present contracts, the 16-ft. pavement is to be widened to 24 ft. and 10-ft. rock shoulders added. Construction of the third and fourth lanes of pavement is being deferred for the present.

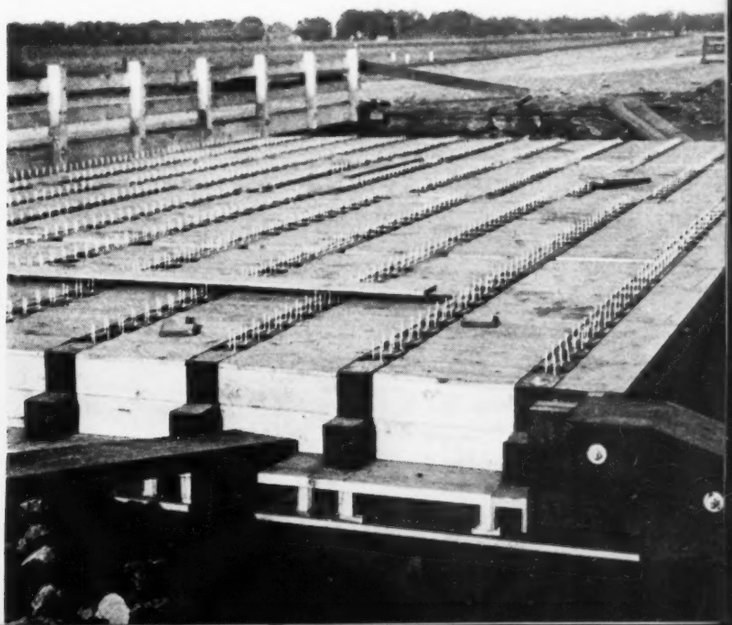
The highway at this location traverses a flat, level valley terrain with a good alignment for the major portion. The existing pavement is 16 ft. wide, with narrow shoulders and with rather deep ditches on either side. A number of accidents have occurred on this section due to the narrow pavement and inadequate shoulders.

The contract provided that the contractor first grade, rock and oil the east shoulder of the existing pavement for a finished width of 10 ft. This shoulder, together with the easterly portion of the existing pavement, provided a surfaced way over which to handle traffic while the pavement-widening work on the westerly side of the existing pavement was performed. This easterly shoulder also remained to serve as a permanent shoulder for the improvement. In the widening of the pavement, the westerly shoulder of the existing pavement was excavated to subgrade, covered with pit-run gravel, finished with crushed screenings and topped with an 8-ft. concrete slab. The slab was immediately adjacent to and at approximately the same elevation as the old pavement. In order to minimize curing stresses, the cement content was held down to 4½ sacks per cu. yd. of concrete. On the completion of the concrete widening strip, the old 16-ft. concrete and the new 8-ft. concrete strip will be covered and finished with asphaltic concrete approximately 3 in. in thickness.

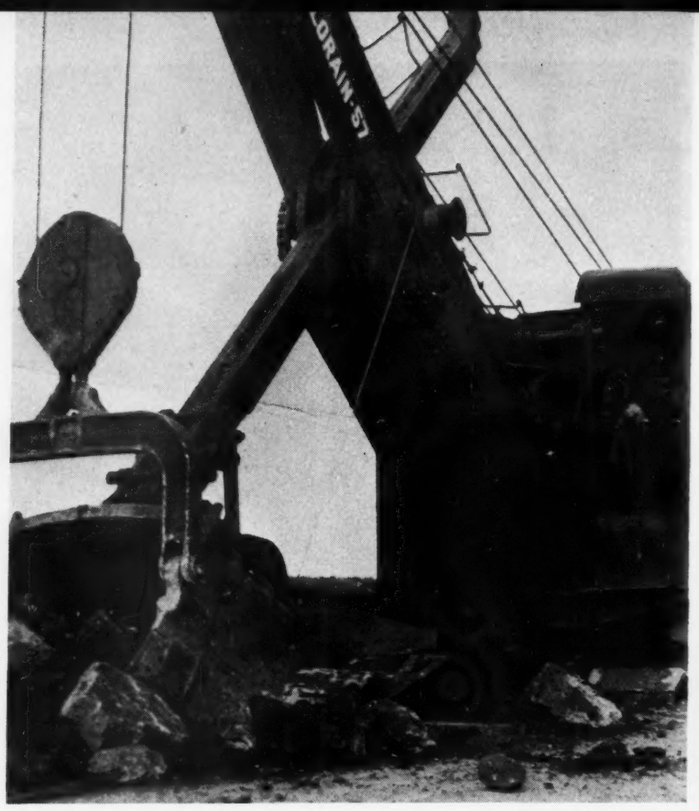
Old Bridges Replaced—The existing timber bridges on the section are being replaced under a separate contract. The new structures are composite treated-pile trestles of a minimum

(Continued on page 142)

STEEL SPIKES (below) form metal connectors between concrete deck of bridge and treated timber stringers, making series of T-beams.



WORN CONCRETE SURFACE is cut away by pavement breakers driven by compressed air.



OLD CONCRETE is removed by Lorain power shovel prior to patching pavement surface.

Highway Maintenance

Carries on Despite Wartime Shortages of Labor, Equipment and Materials

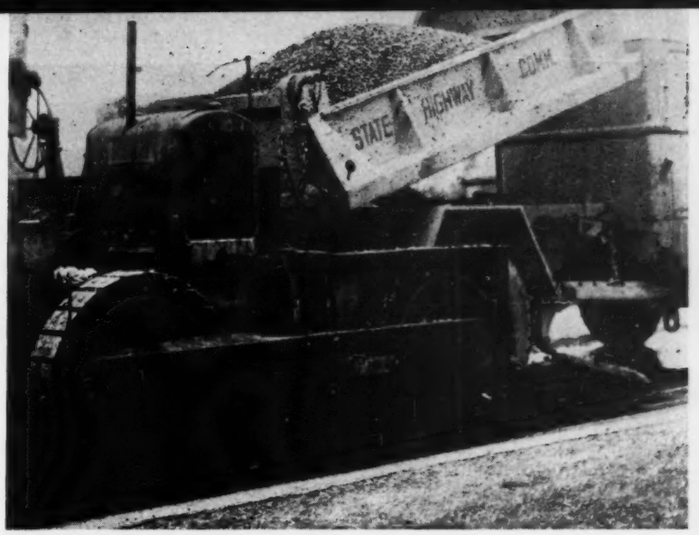
FROM WHEELBARROW concrete is deposited in area of patch and screeded to smooth finish.

CONCRETE IS MIXED at job site (below) for patching portland cement concrete surface.

WARTIME HIGHWAY MAINTENANCE, often on a larger scale than peacetime operations, must be carried on despite shortages of labor, materials and equipment. Concentration of truck traffic has contributed to the failure of many roads. These have not been rebuilt because new construction has been restricted. To keep traffic moving on these roads it has often been necessary to make many so-called temporary repairs rather than one more or less permanent repair.

Indiana is divided into six highway districts, each with a district engineer as supervisor. Under him is the assistant district engineer of maintenance. Six sub-districts are each supervised by a sub-district superintendent. Under him

SMALL BITUMINOUS MIXER produces cold mix at location of repair on a state highway in Indiana.



MECHANICAL SPREADER, a Jaeger machine, applies bituminous mix to roadway in layers varying from 1 to 2 in.

By N. F. SCHAFER
Superintendent of Maintenance
State Highway Commission of Indiana

is a shop foreman in charge of equipment repairs; other employees in the shop are mechanics, assistant mechanics, a blacksmith and laborers.

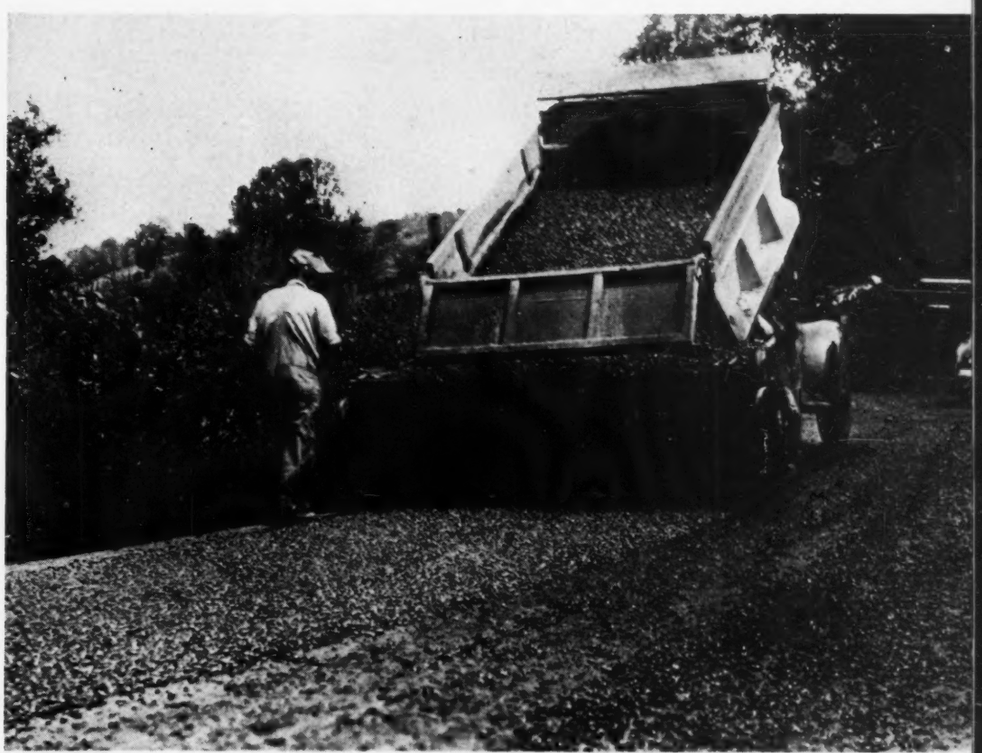
Highways in a sub-district are grouped into patrols, with a patrolman charged with upkeep. Under him are machinery operators and laborers. Special patch, sign and bridge crews, under foreman, work out of the sub-district headquarters.

The accompanying table shows the number of men regularly employed in each permanent classification and the number of men who have been hired as replacements since Jan. 1, 1942.

MAINTENANCE PERSONNEL.

	Regularly Employed	*Replacements Since Jan. 1, 1942*
Shop Foremen	36	15
Foremen	36	21
Signmen	36	35
Patrolmen	473	338

Approximately 75 percent of the ma-



AGGREGATE is placed by chip spreader to form bituminous mat on drag-type surface.

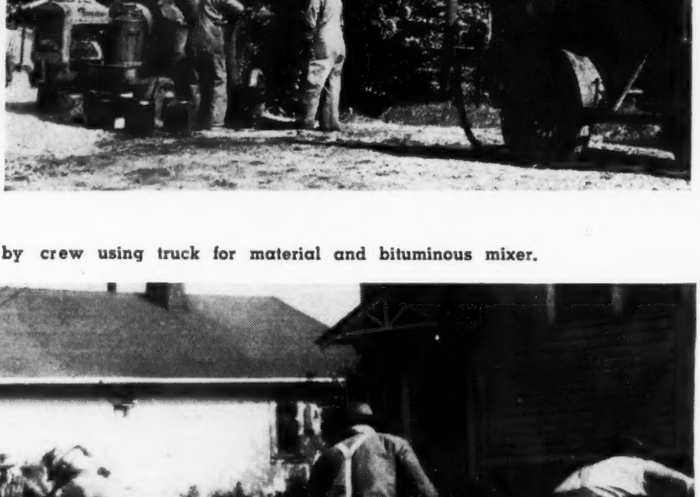
BITUMINOUS MATERIAL (below) is sprayed on covering aggregate by pressure distributor.

MULTIPLE-BLADE MAINTAINER (below) thoroughly mixes and levels aggregate and bituminous material.

LIGHT SEAL of bituminous material and chips is applied to surface and then is dragged with broom to insure smoothness.

TEN-TON ROLLER (left) compacts road-mixed material.

TAR HEATING KETTLE (below) of 300-gal. capacity equipped with pump and spray nozzle is used to apply bituminous material to small areas that are to be skin-patched.



chinery operators have resigned. The majority of the replacements know nothing about maintenance. Few of them know how to operate a piece of equipment satisfactorily. Most of the new employees move on to better paying or more secure positions after they have been taught how to handle a piece of equipment or how to maintain a road.

Various methods are used to teach maintenance to a new employee. The most successful is for an experienced person to work with him on the road and show him how the various operations are carried on. Very often an inexperienced patrolman will have a patrol adjacent to a patrolman who knows the work. These men can work together and the new man can gain knowledge from the experience of the older employee.

Roads that carry the greatest amount of war traffic are given prior maintenance attention. All state highways, however, are relatively important, because all of them are used by someone who is assisting the war effort.

All surfaces should be patched with the same materials as was used originally for their construction. This practice is carried out in Indiana on all low and intermediate type surfaces, but a cheaper material is used if the high-type pavement will be rebuilt in a reasonable length of time.

Portland cement concrete surfaces are patched with portland cement concrete, by force account and contract. Standard procedure and specifications have been

SUNKEN CAR RAILS (below) in concrete pavement are patched over by crew using truck for material and bituminous mixer.

adopted for this type of work because it is important that patches be constructed properly and be of the correct size and shape. This is the most expensive kind of patching and improper methods can mean a loss of money, labor and materials.

General instructions on concrete patching areas follow:

(1) One-way traffic shall be maintained at all times, with sufficient signs, flares and barricades to protect the new work and the traveling public.

(2) Areas to be patched shall be marked by means of paint lines. The marks shall be placed well ahead of the work being done by someone authorized by the district office to do this marking.

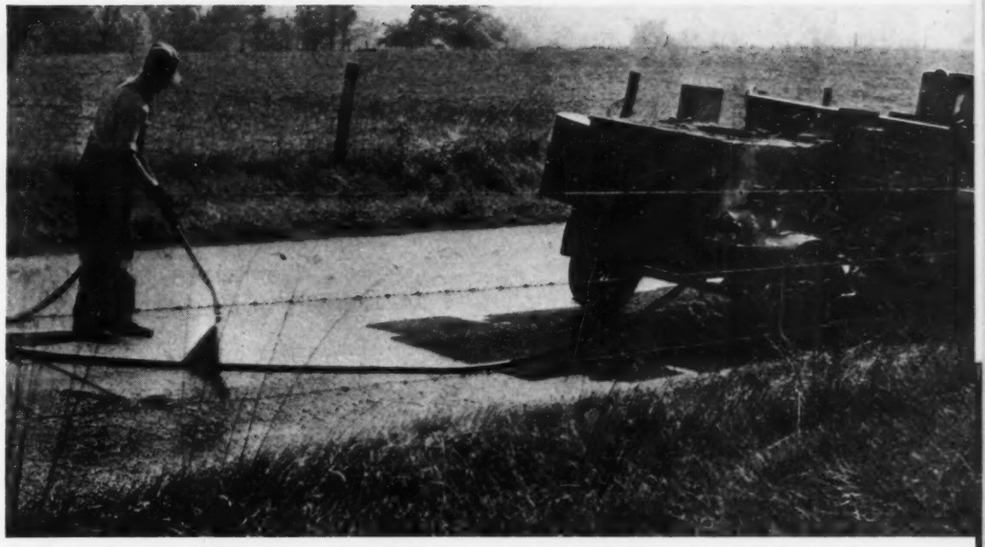
(3) The old pavement shall be removed by methods that will not excessively damage the adjacent pavement. The edges remaining shall be vertical and the maximum deviation from the vertical plane shall be 1½ in. The subgrade shall be leveled to provide for the required depth of the patch.

(4) Old concrete which has been removed from the pavement shall be removed from the shoulder as soon as possible.

(5) At locations where the patch is to extend completely across the pavement, the removal shall first include one side only, plus approximately 1 ft. beyond the centerline. A wood form shall then be placed to coincide with the centerline and soil placed between this form and the portion of the pavement which has not been removed. After the first side has been poured and the curing completed, this new concrete shall be opened to traffic. The wood form shall then be removed, together with the remaining concrete pavement and the patch completed. This method of construction will result in a butt joint coinciding with the centerline of the pavement.

(6) If the subgrade is in poor condition,

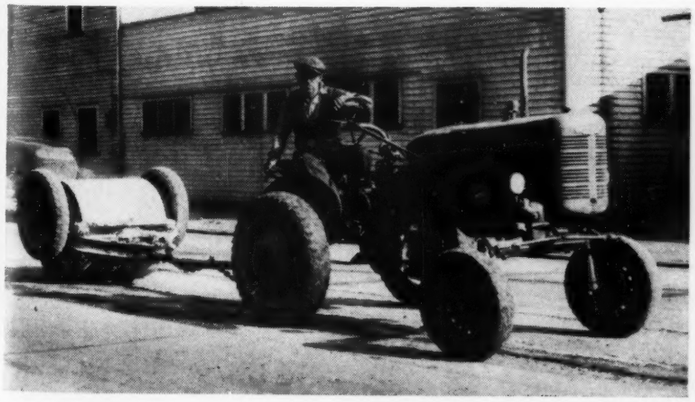
(Continued on page 166)



HAND SPRAY OUTFIT attached to tar kettle primes bituminous surface preparatory to patching.

ROCK ASPHALT PATCH is placed by hand, with ¾x3/16-in.x14-ft. bars used as guides to strike off asphalt and produce uniform surface.

PORTABLE ROLLER (below) with moving machine tractor compacts bituminous patch over car rails.



FIVE-TON ROLLER (below) is used to consolidate and smooth patch.

200 Bituminous Repaving Contracts

IMPROVE 40 MILES OF BOSTON STREETS

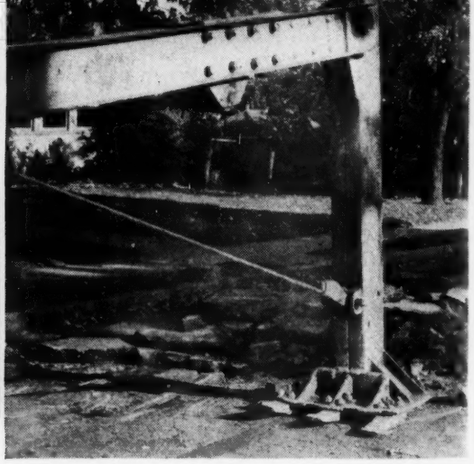
STRIPPING OF OLD BITUMINOUS PAVEMENT proceeds rapidly and economically with three-tooth attachment replacing bucket on General ½-yd. pull shovel. Baker & Co., contractor, makes good use of this device, invented by Henry Baker, who has applied for patent.

BOSTON STREETS and other city facilities are built and maintained by Public Works Department under direction of GEORGE G. HYLAND, commissioner of public works.

THREE TEETH of stripping device on pull shovel (below) bite under bituminous surface and lift 3- to 4-in. pavement in chunks from waterbound macadam base.

STRIPPING SHOVEL (below) gets shot of grease from Alemite gun in hands of JAMES DE SISTO, machine operator, brother of Albert De Sisto, superintendent in charge of job for Baker & Co.

WELDED ATTACHMENT (below) with three teeth bolted to it replaces bucket at digging end of dipper stick on pull shovel. Machine appears able to strip 1,500 to 2,000 sq. yd. a day of old bituminous pavement.



DETERMINED TO TAKE CARE of an accumulated deficit of street maintenance and improvements as soon as manpower and materials became available for the purpose, the Boston City Council, at the request of the Public Works Department, early in 1944 authorized the borrowing of $3,000,000 to put unsatisfactory streets, neglected by necessity during the first two and a half years of the war, into first-class condition. Acting on this authority, the Public Works Department quickly activated the program, previously organized and scheduled on paper, by letting contracts as rapidly as the paving firms in the metropolitan area could handle them. During 1944, 233 separate contract jobs were completed at a total cost of about $1,500,000; the remaining $1,500,000 allotted to the work will be similarly expended this year (1945).

In the main, the money spent during 1944 went into reconstruction and resurfacing of street pavements with bituminous concrete or sheet asphalt. The contracts covered a considerable range of varied conditions, a few of which are indicated by accompanying photographs of typical operations visited during an October afternoon by a field editor of CONSTRUCTION METHODS. Jobs of these

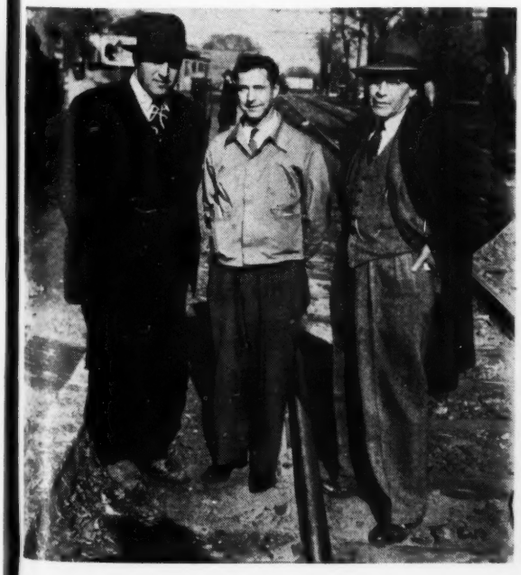
(Continued on page 118)

BROKEN SLABS of stripped bituminous pavement are scooped up for loading on Baker & Co. contract by 2½-yd. Traxcavator shovel on Caterpillar D4 tractor.

BLACK TOP PAVER spreads, strikes off and partially compacts 1¼-in. binder course of hot-mix material delivered to machine by end-dump trucks on Dooley Bros. job, paving street with 4-in. penetration macadam base and 2¼-in. hot-mix top.

TANDEM ROLLER (right) consolidates stone in 4-in. penetration macadam base for 2¼-in. bituminous pavement on contract of Dooley Bros., Inc.

ON SHEET ASPHALT JOB of S. J. Tomasello Corp., **ANTHONY S. J. TOMASELLO** (below, left), superintendent and son of founder, confers with **GEORGE E. BERTINI** (center), construction engineer, and **JOHN M. KELLY**, inspector, Public Works Department.



SHIM BINDER COURSE (below) for hot-mix bituminous concrete pavement is supplied and laid by Old Colony Construction Co. for M. De Matteo, contractor, using hand labor and power roller.

WATCH 2-CYCLE!

The Modern Diesel for Modern Road Builders

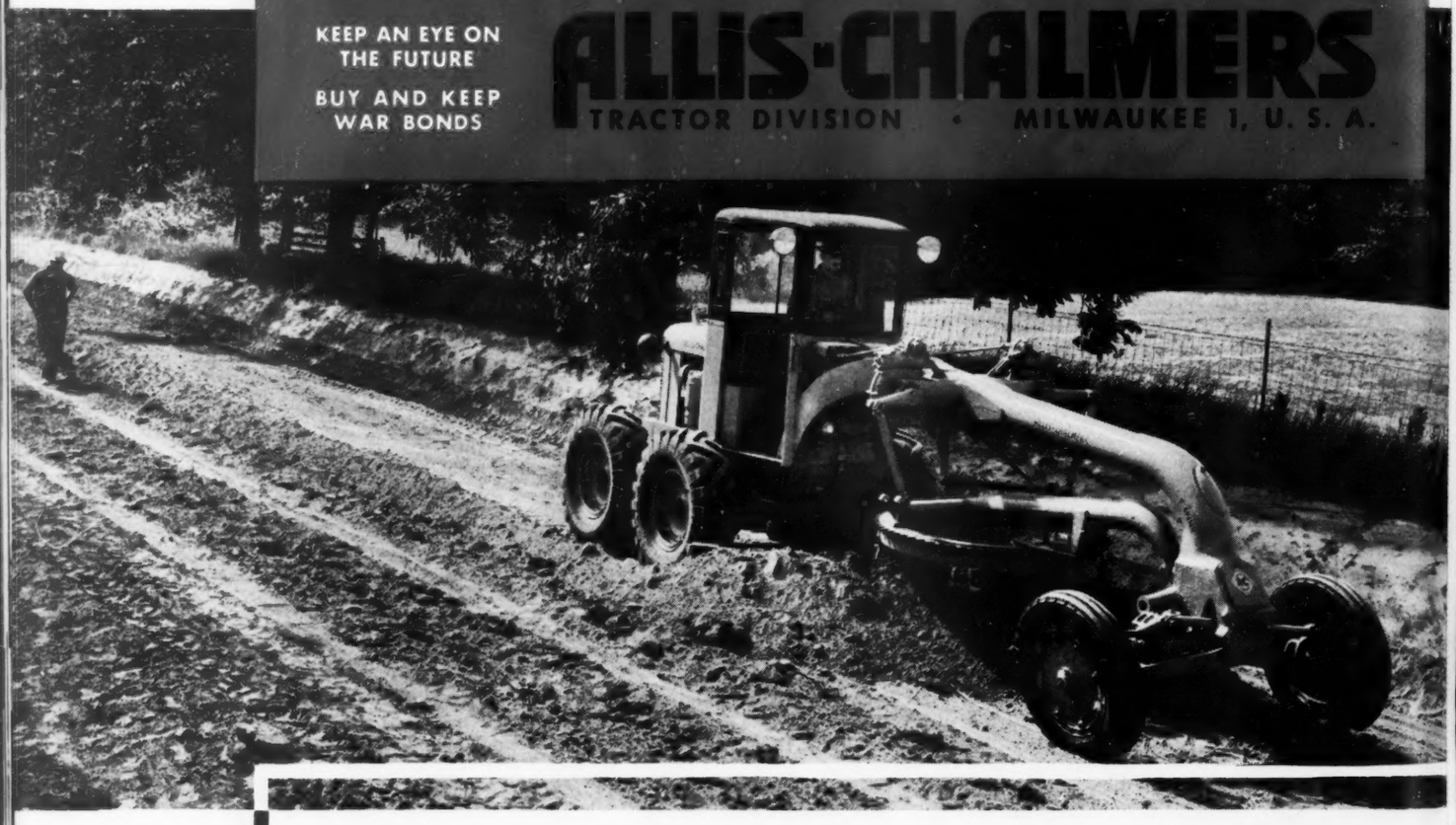
Keep your eyes on 2-cycle Diesel tractors and motor graders! Out to smash all earth-moving records . . . these units will play an important part in pushing through the big construction jobs ahead. When they are working in your territory . . . check their performance . . . satisfy yourself that 2-CYCLE is the kind of power you want.

KEEP AN EYE ON THE FUTURE

BUY AND KEEP WAR BONDS

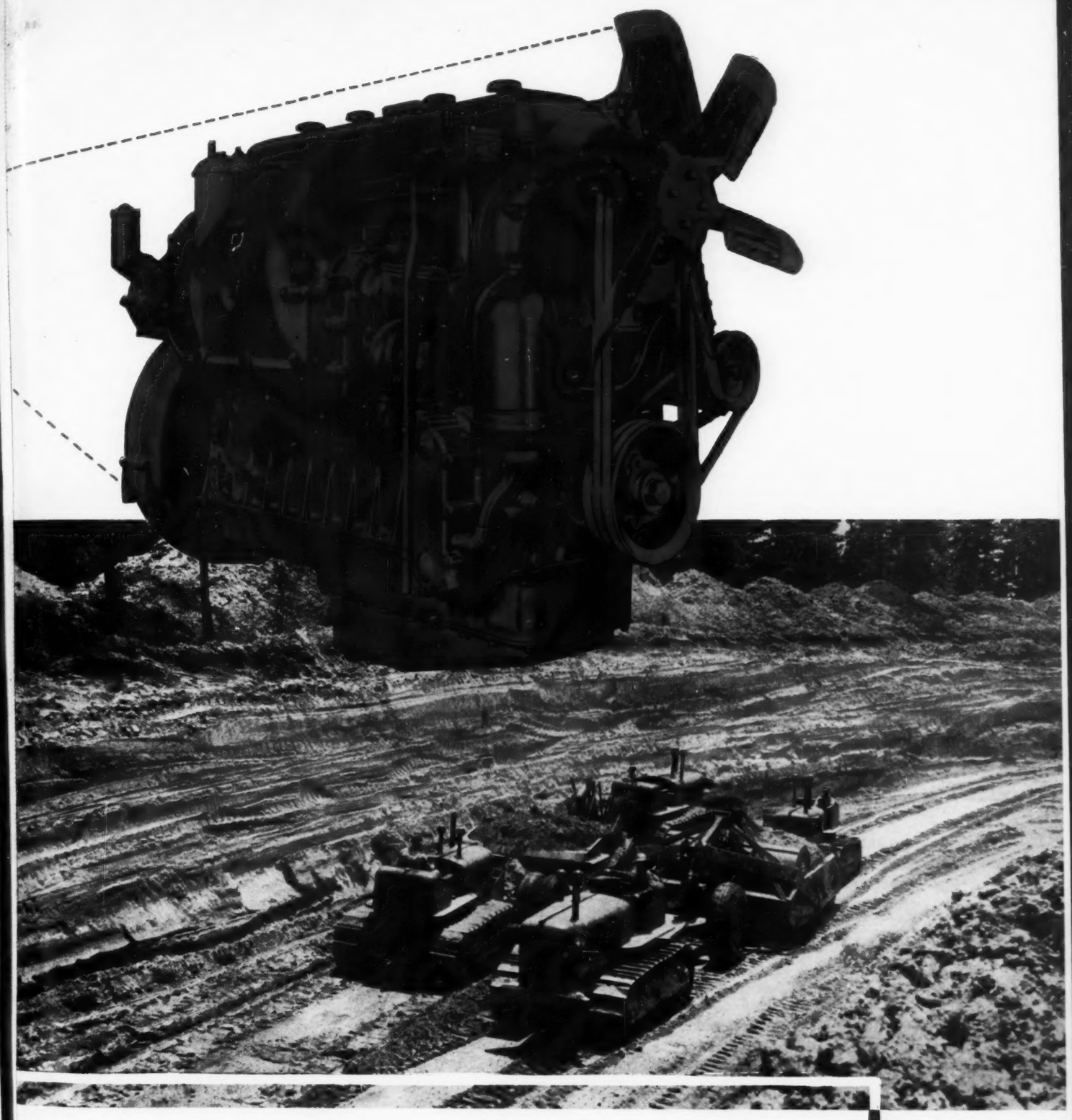
ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.



WHAT 2-CYCLE DIESEL POWER MEANS . . .

TO A MOTOR GRADER It means power to move *more material.* Extra dirt-moving capacity is built into the A-D Motor Grader. You can handle the heaviest kind of work—from deep, tough scarifying to high, heavy bank cuts. You get a *smoother job,* too — has the reserve power to carry you through tough cuts with fewer blade adjustments. Gets the job done *faster* — works in a higher gear!



TO A TRACTOR It means *plenty of drive!* Every down stroke of the piston is a power stroke. It means *smooth power* — maintains high torque over a wide speed range. It means *faster power* — there is quick pick-up . . . less gear-shifting . . . high-speed hauling. It means *thrifty power.* Unit injectors simplify fuel system, reduce maintenance cost — fuel is thoroughly atomized, burns completely and develops maximum power.

WHAT DOES AMERICA WANT?

IT IS THE PURPOSE of this editorial, the thirty-first of a series, to state the urgent need for a clear declaration of American policy in world affairs.

Within the past few weeks there has been a wakening conviction in this country that the determination of international arrangements cannot safely be put aside until victory has been won. For we have seen actions taken in Europe seemingly without full consultation and agreement of the Allied powers, which may profoundly affect the design of the post-war world.

A declaration of American policy is needed, and it should be accompanied by a statement of our firm intention to exert full effort to procure its acceptance and furtherance. Emphatically, this does not mean that an American platform should be put forth as an ultimatum, which other nations must accept totally, or reject at the cost of having the United States withdraw from collaborative participation in world agreements and organization. On the contrary, the first plank in such an American platform should be a firm commitment on our part to participate with our associate nations in building a general system of world security and order. By definition, this requires that each participant be willing to accommodate its purely national interests to a program that can be accepted as fairly representing the interests of all. But equally, there is imposed on each participant an obligation to state honestly and openly what it conceives its individual interest to be, as well as its concept of what measures will best serve the general interest.

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Americans have displayed a singular diffidence in the matter of formulating a bill of American objectives — singular, in that it contrasts so sharply with our power to exercise as broad a leadership as we are able to define. This reluctance stems partly from the inherent difficulty of arriving at a coherent statement of national aims in a country like the United States — so vast in area, so multiple in its sectional and group interests, and so soundly committed to the free expression of individual thought. But it stems also, in part, from a tradition of national isolation which, however understandable in historic perspective, now stands clearly discredited by two world wars which were not of our making, but from which we were unable to hold aloof.

That the economic wellbeing and political security of the rest of the world is closely bound to the decision and performance of the United States is questioned nowhere but in America. Political boundaries and restrictions cannot build effective fences against the interplay of economic forces, and the sheer weight of American economic influence is of crucial import to all the other nations of this globe. In large measure their decisions will be shaped either in response to the opportunities that our procedures offer them, or in defense of interests that our procedures may jeopardize.

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The United States contains only about 6 percent of the world's population. But — our national income, before the war, amounted to almost 25 percent of world income; our industrial output as a whole approximates 45 percent of world totals, and we now are producing a like percentage of the world's munitions; we have 35 percent of the world's railroad mileage; 25 percent of merchant fleet tonnage; 50 percent of the world's telephones; 45 percent of steel production; 40 percent of aluminum production; 33 percent of coal output; we are refining (though part of the production comes from imports) 55 percent of the world's copper, and 70 percent of its petroleum; we now are producing 50 percent of the world's rubber (though post-war resumption of natural rubber production will sharply reduce this balance); our shares of agricultural production are, of course, much smaller, but just before the war we accounted for 35 percent of world cotton production, 15 percent of wheat, and 10 percent of wool.

Whether we like it or not, we must exercise political responsibilities commensurate with the weight of our economic power in an inter-dependent world. But before responsibilities can be assumed, they must be defined. Can the United States arrive at a clear agreement and statement of aims for which it is willing to stand sponsor?

The recent campaigns of both political parties have helped to provide an encouraging answer. In general, election mandates are glaringly deficient as indicators of a unified national purpose. A majority of voters declare themselves for the winning candidate. But even among the majority there are varying degrees of enthusiasm for the platform principles espoused by their candidate; and the substantial minorities of the defeated parties may have had no enthusiasm whatsoever for particular planks in the winning platform, or for the platform in its entirety. A sportsmanlike deference to the will of the majority is a feeble substitute for unified national conviction.

But this Presidential campaign was noteworthy for certain basic principles upon which both the platforms and the candidates of the major political parties were

united. Surely, upon such areas of agreement there may be said to have been an American mandate; the more so, because upon certain of them, we have evidence that no party or candidate could have declared opposition with any hope of victory. What then were these agreed-upon principles? The following is an attempt at a fair summary:

1. That America, in collaboration with its Allies, is committed to seeing the war through to the unconditional surrender of our declared enemies.

2. That America is committed to a responsible role in a world security system after the war, including a commitment to lend the support of our armed forces to repel aggressions that may violate such security.

3. That America is committed to the post-war goal of substantially maintaining in this country an economy that will provide jobs for those who are able and willing to work.

4. That America is committed to the principle of achieving this goal of sustained, high-level employment of manpower and economic resources under a system primarily activated by competitive enterprise.

These are American mandates. They can be made the nucleus of a coherent national policy, for they define aims upon which the great majority of our people are emphatically agreed. But no one can pretend that in this generalized form they serve as more than directional guides for either internal legislation or international negotiation. This skeleton of aims must be clothed with the living flesh of agreed-upon means. Here we have no national mandates of comparable clarity, but it is patently clear that it is our compelling task to achieve them.

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On our elected representatives in government rests the primary responsibility for formulating the specific programs required to implement national policies. Under our system of government, those representatives need continuous nourishment in the form of mandates as to what the people want. Particularly during a period when so many urgent problems are being thrashed out upon an international basis, this imposes a grave responsibility upon all sectors of our citizens; for it requires them to think in terms of the welfare of our nation as a whole, to focus upon those points which offer possibilities for substantial agreement among Americans, rather than upon matters of individual, group, or sectional advantage.

In earlier editorials I have tried to define a basis for national policy in keeping with that broad purpose. They have dealt with problems that are basic to the healthy functioning of free enterprise under the competitive system, with the mobilization of our resources for war and for reconversion to peace-time production, with labor and management responsibilities and relations, with national debt and taxation, with foreign trade and our economic relationships abroad, with the industrial development of backward areas. Since they have been presented in the McGraw-Hill publications, which reach a group broadly representative of all American industry, they have centered upon problems that have an economic rather than a strictly political import.

Future editorials, to appear during 1945, will deal with comparable subjects selected in recognition of the urgent importance for arriving at concerted definitions of national policy. I am fully aware that no individual or group can speak authoritatively for the American Nation. But I hope that an honest attempt to formulate sound concepts of national interest in crucial economic matters will help to crystallize American policy both by focusing agreement and by eliciting dissent.

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Here there is space only to indicate in broadest outline what I conceive to be desirable foundations for an economic policy for the United States:

1. The attainment of a high and sustained level of business activity and employment in the United States and in the world.

2. Active and expanding markets for world trade based upon fair competition rather than upon bloc agreements, discriminatory preferences, and cartel arrangements.

3. The encouragement of industrial development in nations that have been backward in that respect.

4. A recognition that hospitality to imports, rather than constituting a threat to national standards of living, offers in fact the most potent instrument for international bargaining that any nation can command.

5. A willingness to assume a responsible national role in international arrangements designed to provide such financial stability as may be needed to support mutually advantageous world exchange of goods and services.

We must see to it that the end of military warfare does not merely open the door to an era of economic warfare.

The fact is that America has no choice but to assume leadership in world affairs. For the weight of our influence will be felt by other nations no less whether our attitude be positive or negative. And the cost to us of any international obligation which we might undertake must in all fairness be weighed against the equally real cost to us of dealing with measures that others may take to protect themselves against the results of our non-participation.

We have tended in the past to approach international commitments timidly, fearful that we might be outwitted in a world battle of wits. And in so doing, we have too often ceded to others the initiative of suggestion, leaving to ourselves the thankless task of accepting or rejecting what they demand of us.

Our one bargaining weakness stems from the fact that other nations, by contrast feeble in potential power, know what they want and are able to mobilize all their strength to achieve it.

America can be the most effective nation on earth — if only it knows what it wants.

President McGraw-Hill Publishing Co., Inc.

Present and Accounted For...A PAGE OF PERSONALITIES

FATHER AND SONS operate contracting firm of N. Fiorito Co., of Seattle, Wash., which paved concrete runways and aprons for U. S. Engineers at Boeing Field, described elsewhere in this issue. Father Nick Fiorito (with hat) is flanked by sons Paul and Dan.

NEW PRESIDENT of American Society of Civil Engineers is JOHN CYPRIAN STEVENS, Portland, Ore., consulting engineer. He will take office at annual meeting, Jan. 17-19. In addition to his consulting practice, Mr. Stevens is inventor of many engineering instruments and is senior partner in firm of Leupold & Stevens Instruments.

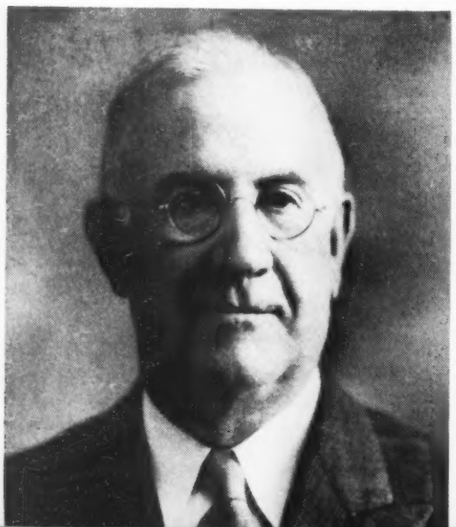
NEW PRESIDENT elected at Cincinnati meeting of American Association of State Highway Officials is HERMAN A. MacDONALD (left), commissioner, Massachusetts Department of Public Works, which he has headed since 1940.

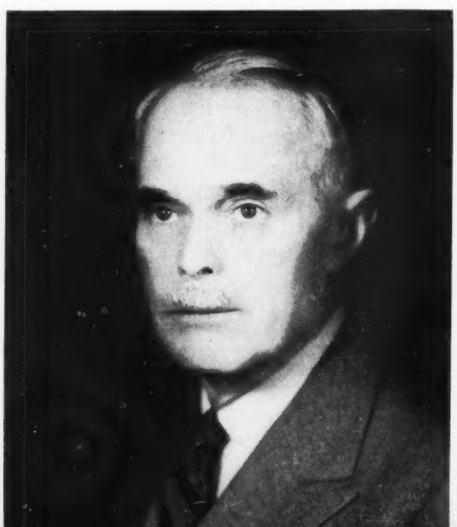
ONE HUNDRED YEARS in construction business is completed by James Stewart & Co., Inc., builders, of New York City. In last three years, this company, with HARRY D. WATTS (right) as chairman of the board, has participated in construction of more than $250,000,000 worth of war plants.

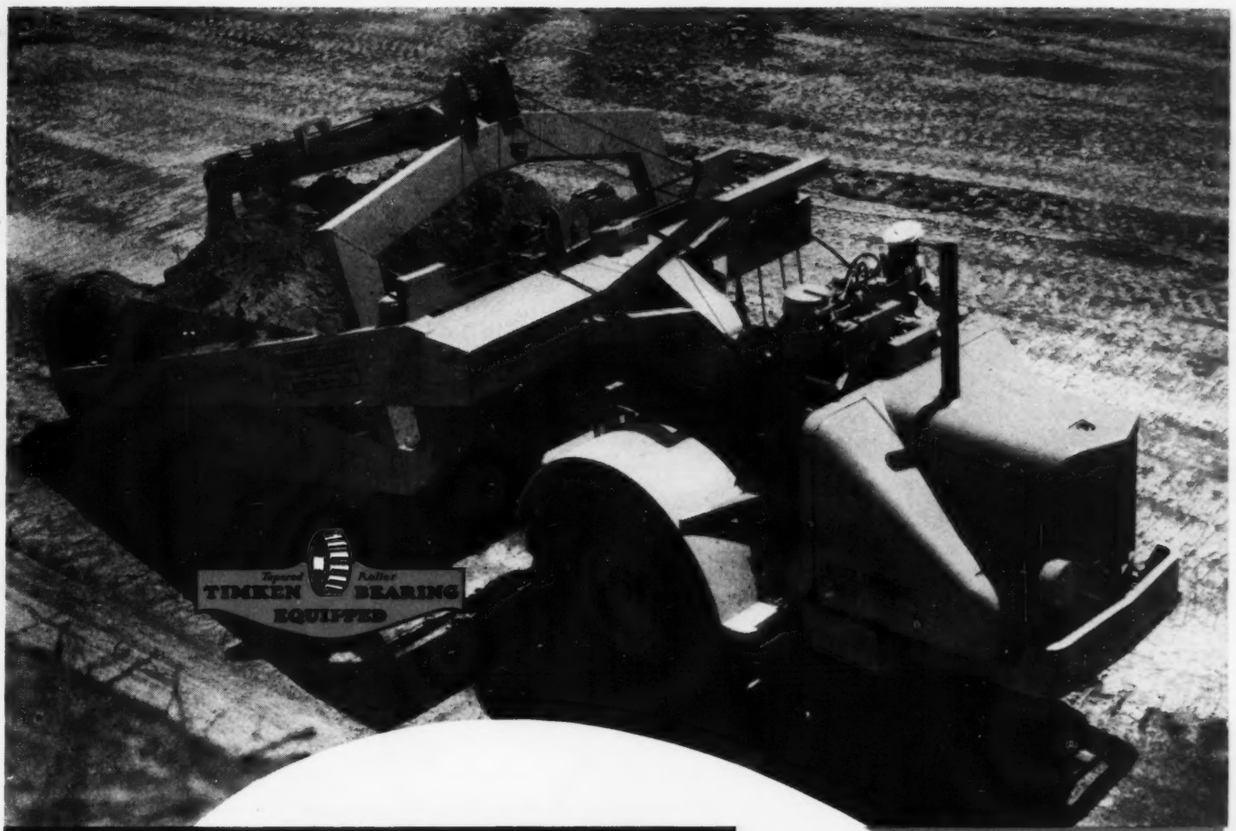
ELECTED PRESIDENT of American Road Builders' Association is JAMES J. SKELLY (below), senior partner of James J. Skelly Co., contractors, Media, Pa. He has been president of A.R.B.A. Highway Contractors' Division for last two years and is beginning his eighth term as president of Associated Pennsylvania Constructors.

APPOINTED DEPUTY COMMISSIONER in charge of Department of Construction and Maintenance, U. S. Public Roads Administration, is J. S. BRIGHT (below). He succeeds H. K. Bishop who has retired. Mr. Bright has been with PRA since 1917 and directed American and Canadian contractors in construction of Alaska Highway in 1942-43.

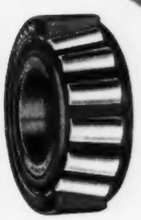
NEW GENERAL MANAGER and chief engineer of Los Angeles Department of Water and Power is SAMUEL B. MORRIS (below), who has been dean of Stanford University's School of Engineering since 1936. He succeeds H. A. Van Norman, resigned after 37 years' service with department.







WOOLDRIDGE "Terra Cobra" shows amazing mobility on TIMKEN BEARINGS



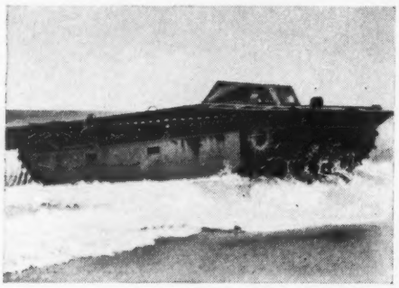
Big as the "Terra Cobra" is, (struck capacity 14 yards, heaped capacity more than 18 yards) it possesses remarkable agility and nimbleness. As one observer put it: "It is amazing to see the manner in which this machine can get around. All the fore-and-aft pitching and the often-referred-to 'sun fishing' are entirely eliminated in this machine."

Naturally the basic design of this unusual piece of equipment, plus careful, accurate manufacture, is mainly responsible for its surprising performance, but Timken Tapered Roller Bearings — 16 of them — in wheels and other important positions, make valuable contributions to smooth, fast operation; economy; endurance; low maintenance; and long machine life. They do this through their ability to eliminate friction and wear; to carry radial, thrust and combined loads; and to hold moving parts in proper and permanent alignment.

Wooldridge Manufacturing Company selected Timken Bearings for the "Terra Cobra" with the confidence born of long experience with them in other Wooldridge dirt movers, including power control units. Thus "Timken Bearing Equipped" points the way to top-notch performance when buying construction equipment of any kind. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

AMPHIBIOUS TRACTORS FOR SALE



One of the most useful types of war vehicles now in service with the Armed Forces, particularly in the Pacific, is the amphibious tractor known as "Water Buffalo," or LVT (Landing Vehicle, Tracked).

As the designers (in cooperation with the Bureau of Ships, U.S. Navy), engineers and manufacturers of "Water Buffalos," we of Food Machinery Corporation believe there will be a postwar market for amphibious tractors redesigned and built for *commercial* use. The purpose of this and similar advertising is to find out if we are right.

These versatile machines travel as readily on water as on land. Their amazing mechanical stability enables them to be driven through heavy seas, across reefs, onto beaches and over the roughest terrain. Hauling cargos of men, supplies and equipment, they easily negotiate swamps, jungles, rivers and rugged country impenetrable by any other vehicle. They possess extraordinary maneuverability, power and traction... turn on a dime, knock over trees, climb like mountain goats!

Now our entire output of amphibians is going to the Army, Navy and Marines. But we have published a folder containing descriptions and specifications for a commercial amphibian. We will be glad to send this folder to interested business executives who feel that their firm might have use for a postwar "Water Buffalo."

Some of the operations for which the peacetime amphibian may be suitable are:

- Mine prospecting
- Mining
- Surveying
- Rescue work in flood, ice and marshland
- Flood control work
- Maintenance of oil, water, power and telephone lines
- Non-navigable river transportation
- Timber cruising
- Lumbering
- Road construction
- Equipment hauling
- Geologic work
- Jungle trucking
- Mosquito control
- Coast transportation, particularly where no dock facilities are available

Probably, after reading our folder, other uses will occur to you, possibly in your own field. Write for the folder to "Water Buffalo," Food Machinery Corporation, Riverside, California.

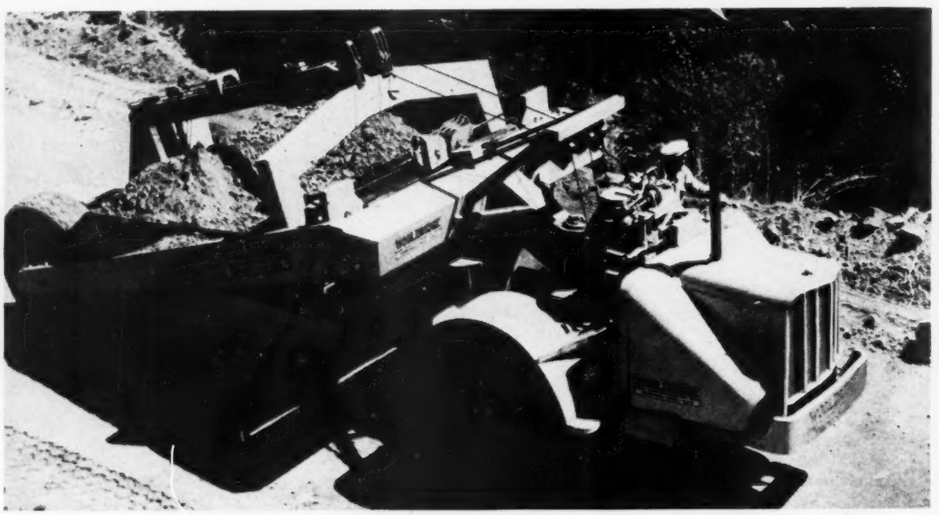
ARMY E NAVY

FOOD MACHINERY CORPORATION

RIVERSIDE DIVISION, RIVERSIDE, CALIFORNIA

CONSTRUCTION EQUIPMENT NEWS

JANUARY, 1945 REVIEW of Construction Machinery and Materials



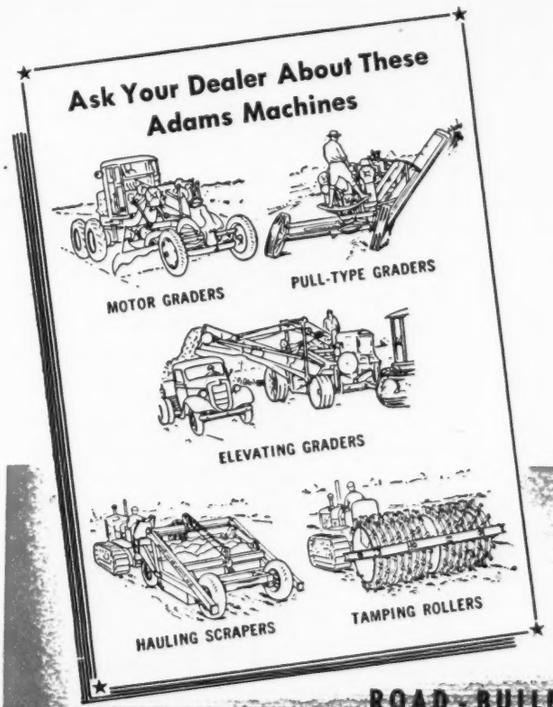
SELF-PROPELLED EARTHMOVER named "Terra-Cobra" and designed for high speed material handling operations, embodies many new features which insure fast and efficient performance coupled with maximum safety of operation. Positive two-wheel hydraulic steering gives operator full control of unit by maintaining fixed direction of travel over all types of ground and at all speeds. No steering clutches nor individual front wheel brakes are employed. Both drive wheels turn at exactly same time under full traction and power by means of single steering bar. As one wheel never "idles" while other turns there is never any chance of "jackknifing." Thus accidents are avoided and damage to equipment materially reduced. Powered by heavy-duty diesel engine with four speeds forward, plus reverse gear, Terra-Cobra attains travel speeds up to 20 mph. Surplus rim-pull not only permits rapid acceleration to any desired speed in short distance but also provides sufficient power for fully loaded unit to climb comparatively steep slopes without help of a "Pusher." Terra-Cobra possesses great flexibility of travel over rough surfaces. This is accomplished by means of massive universal oscillating king-pin which couples prime-mover to heavy-duty scraper. Due to its dual operating action, this pivot allows free radial turning to right or left while either or both units are tilted in opposite diagonal planes. Thus there is no danger of one unit tipping other, and twisting, stresses and strains are thereby avoided. With maximum weight balanced and centered at pivotal point there is no tendency for engine to "sky" or "dip" to cause excessive shock and wear on coupling. Another feature: air-operated non-slipping cable hoist, which responds instantly to finger touch. Even pressure is maintained on cables, avoiding "jerky" starts or stops when reeving in or out. Braking power is applied by air brakes on rear of scraper and equally on both wheels at exactly same time, thus avoiding opportunity for either brake to "grab." Heavy fast moving loads can be slowed down or stopped in shortest possible distance with operator in complete control of machine.—**Wooldridge Manufacturing Co., Sunnyvale, Calif.**

★ ★ ★

PLASTIC INSULATING TAPE named "Fibron" and claimed to be remarkably flexible and elastic, is used for insulating wires, cables and electrical equipment, for splicing cables, and for protecting wiring, piping and equipment exposed to caustic or corrosive fumes, oil, grease, acids, alkalis or moisture. Said to be heat-sealing, flame resistant and high in dielectric and mechanical strength.—**O. S. Tyson & Co., Inc., 230 Park Ave., New York 17, N. Y.**

FROM DITCH CUTS TO BANK CUTS

Without Mechanical Adjustments



*** MANY road grading jobs call for frequent alternating between ditch cuts and bank cuts—particularly where several bank cuts are necessary.... With Adams motor graders the operator can alternate between deep ditch cuts and high bank cuts, as pictured above, without shifting the blade on the circle or adjusting the length of blade lift links. Simply by using his operating levers, he goes from one position to the other in less than a minute—almost in the time it takes the outfit to turn around.

This is but one time-saving reason why your next motor grader should be an Adams. See your local Adams dealer now about the availability of new machines.

J. D. ADAMS COMPANY
INDIANAPOLIS, INDIANA

ADAMS

ROAD-BUILDING AND EARTH-MOVING EQUIPMENT

LEGAL ADVENTURES of TRACTOR CONN

By LESLIE JOBB

No contractor ever tries to be his own dentist or his own shoemaker. It is even more dangerous for him to be his own lawyer. There are, however, some legal rules which every contractor should know, and these rules may be explained in plain English without resorting to the jargon of the law, unintelligible to most laymen.

This series of articles, dealing with the Legal Adventures of Tractor Conn, a typical contractor anywhere in the United States, explains some of these legal points in plain language for the contractor. Each one is based on an actual decision of an American Court.

The Case of the Compensation Insurance

"I'll have to place our workmen's compensation insurance for the coming year," Tractor Conn suggested.

"And we'll be glad to have your business again," the general agent of the big insurance company replied.

"The drawback is that you renew the insurance on a certain base rate, these rates are revised later by the rating board of the state, and you really don't know what you have to pay until the rating is made," Conn objected.

"I'll tell you what we'll do," the general agent suggested. "The rating board always raises the base rate, but we'll renew your insurance at the base rate, plus 15 percent, and give you an agreement that that's all you have to pay, regardless of the rate fixed by the board."

"That's just the arrangement I wanted to make, for now we'll know exactly what we have to pay," Conn agreed. The insurance was placed on this basis, Conn paid the agreed premium, the rating board nearly doubled the base rate, and the insurance company sued Conn for the excess premium.

"There's your agreement in black and white that we weren't to be called on to pay any additional premium," Conn protested.

"The state provides that the rate shall be fixed by the rating board, and the contract to charge any different rate is null and void," the insurance company retorted. The New York Court of Appeals, in the case of Peabody vs. Travelers Insurance Company, reported in 148 N.E. 661, ruled in favor of the insurance company.

The Case of the New Warehouse

"I need a new warehouse. If you'll build it according to these plans and specifications and have it ready by October 1st, I'll pay you $15,000," the owner proposed.

"Let me look them over for 24 hours and I'll give you an answer," Tractor Conn suggested. He accepted the offer and a contract was drawn up and signed. Conn started work and, when the warehouse was 90 percent completed, it caught fire. In two hours it was a mass of glowing ruins.

"It might have been worse—might have been completed," the owner averred.

"Of course, you'll pay for what I did do," Conn declared.

"Why so? Carry out your part of the contract, and I'll do the same."

"I'll sue for 90 percent of the contract price," Conn threatened. He was as good as his word, but he lost his suit. The law is that if a contractor is to erect a building and the building is to be completed before any payment is to be made, the completion of the building must precede the payment. If the building is destroyed before it is completed, the contractor must bear the loss.

The Case of the Independent Contractor

Tractor Conn agreed with a Nebraska county to build a certain road according to specifications prepared by the county and the necessary contract was signed.

"Do you want to sublet the graveling on the first ten miles?" John Doe queried.

"Yes, if you'll do it for 49c. per yard," Conn agreed. A contract was signed whereby Doe was to furnish the machinery and labor, haul the gravel from certain designated pits, and spread it on the highway, subject to the instructions of the county authorities.

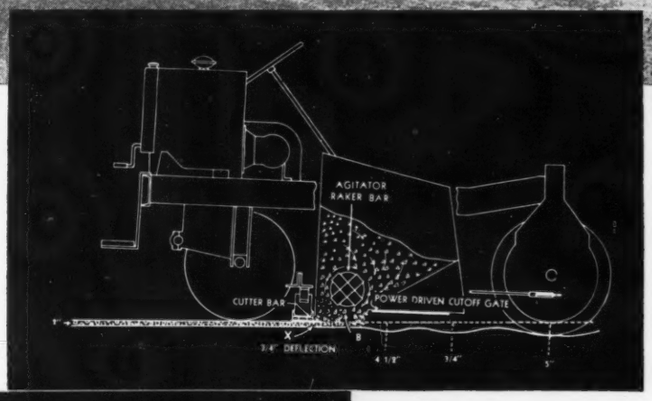
While carrying on this work Doe was injured and made a claim against the county under the Nebraska Workmen's Compensation Act.

"You're not entitled to compensation, as you were an "independent contractor,'" the county contended. The Supreme Court of Nebraska, in the case of Potter vs. Scotts Bluff County, 199 Northwestern eRporter, 507, ruled in favor of the county.

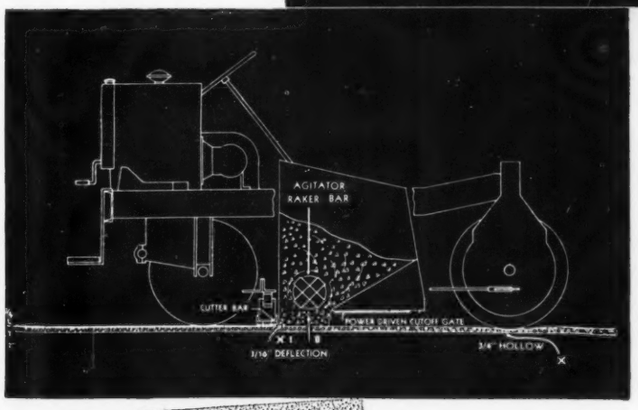
"While the contract specified that the work should be done subject to the instruction of the county highway commissioner, it is apparent that his only concern, or the county's concern, was in seeing that the proper kind and amount of gravel was distributed over the highway. The county had no control over the men; could not hire or discharge them; could not determine the number who should be employed; could not determine the hours of labor, the size of loads, or any of the details. Under the circumstances, we are clearly of the opinion that plaintiff was not an employee of the county, but was a independent contractor," the Court said.

More Legal Adventures of Tractor Conn Next Month

The first course showing front wheel dropped into deep depression.



The top course showing how Continuous Course Correction has reduced hole 5" deep to 3/16".



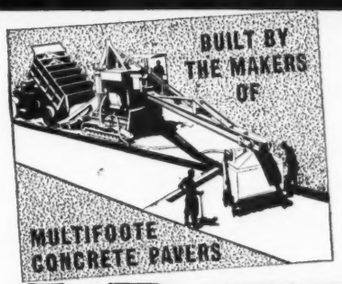
How TO RESURFACE OLD ROADWAYS

with less subgrade preparation

Use the black top paver that automatically reduces the irregularities of the surface with each successive course laid! That's what Continuous Course Correction does in Adnun Black Top Pavers.

The Adnun rides on the finished course close to the cutter bar and well back from the front of the machine. The front wheels can drop into quite a deep depression without materially affecting the leveling action of the cutter bar. For example, a 5-inch drop of the front wheels will leave only a 3/4" depression at the point where the cutter bar is at that time. When the top course is laid, the resulting deflection is reduced to 3/16". Deep holes large enough to permit the wheel to drop the full depth are extreme cases. Generally subgrade irregularities are reduced to insignificance when the top course is laid.

You can lay any mix—hot or cold—any thickness—any width—with an Adnun. You'll be sure of maximum density for your black top paving, tight joints between strips, smoothest finished surface, and all-weather durability. Write today for details or see your Foote distributor.



ADNUN

TRADE MARK REGISTERED

BLACK TOP PAVER

With Continuous Course Correction

THE FOOTE CO., INC.
1910 State Street,
NUNDA, N. Y.
The World's Largest Exclusive Manufacturers of Concrete and Black Top Pavers.

RUST—a nuisance and a very costly menace in many places no longer need be tolerated. Laboratory magic has furnished its master.

New Sinclair products, developed to solve tremendous military rust problems, are now available for your problem.

Sinclair RUST-O-LENE B for exposed metal surfaces of machinery in operation, in storage, or in transit

- *provides a firmly-adhering rust proofing film*
- *prevents rusting of clean surfaces*
- *halts further rusting of corroded surfaces*
- *has lubricating qualities*
- *defies any degree of moisture from mere dampness to heavy rain*
- *can be readily removed when desired*

Sinclair OPALINE RP (Rust Preventing) OILS for enclosed oil systems, prevent internal rusting of engines, hydraulic systems, gear reducers, and similar machinery intermittently operated, stored, or transported. OPALINE RP also has ample lubricating qualities for temporary use.

Both these remarkable Sinclair rust-preventives have successfully passed the most exacting service tests, and fully meet Government specifications.

Learn how RUST-O-LENE B and OPALINE RP can combat rust for you. Write for brochure giving full details.

SINCLAIR LUBRICANTS-FUELS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

WHY SCUTTLE THE SKIP?

YOU DON'T have to pound the life out of a skip to get all the batch into the drum. There's a newer and better way . . . with a Rex Mixer!

For with Rex there is no need to pound, slam or bang the skip. It's the fastest and best skip ever made . . . the "Shimmy Skip" . . . that provides the proper, snappy shaking action that kicks the batch into the drum *fast.* This shaker action is actuated by the lugs in the drum . . . the heaviest part of the machine. What's more, vibration does not reach the power plant or transmission to shorten mixer life. The streamlined design of the skip prevents "pocketing" of the batch. It's a real "time-saver," this "Shimmy Skip" action, that saves seconds on every batch.

But that's just one of the many features you get with Rex. Water control is practically 100% accurate. The exclusive Chain Belt Drive *cushions shocks,* prolongs mixer life. Designed and controlled for heaviest duty, Rex Mixers have less weight, perfect balance for easier transporting and spotting.

You can specify Rex and save time, labor and money. See your Rex Distributor for complete information or write direct for Bulletin No. 446. Chain Belt Company, 1664 West Bruce Street, Milwaukee 4, Wisconsin.

REX

CONSTRUCTION MACHINERY

KOEHRING *Half-Yard* 205 SHOVEL

With the new Koehring 205 you can travel, hoist, swing and raise or lower the boom . . . all at the same time. Contact your Koehring distributor today. Find out how the Koehring 205 fits into your post-war plans.

2 *in* 1 SHOVEL BOOM SAVES COST OF EXTRA PULL SHOVEL BOOM

A new idea in small shovel design, built into the new Koehring 205. You save approximately ½ of the cost of the pull shovel attachment because the same boom handles both dipper and pull shovel. You save in everyday operation because boom stays in place, cutting change-over time to the minimum. 100% welded and of box type construction, the 2-in-one boom works at top efficiency in either conversion.

Orders Accepted NOW For Post-war Delivery . .

KOEHRING COMPANY, *Milwaukee 10, Wis.*

KOEHRING HEAVY DUTY

ARMY E NAVY

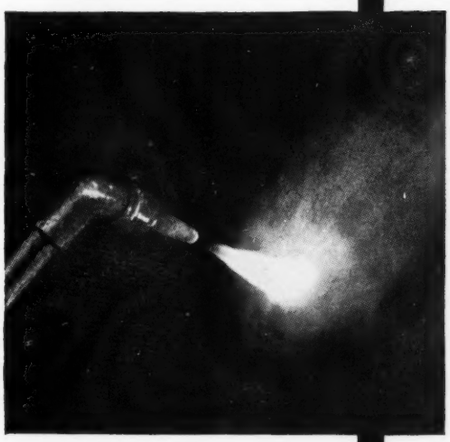
HEAVY-DUTY CONSTRUCTION EQUIPMENT

Canvas Covers Winter Construction

Banish its Fire Hazard with Flame-Resisting Fire Chief Canvas

Canvas covers permit work to go on right through the winter — BUT, ordinary canvas also invites fire loss. A hot rivet, a slip of the welding torch or a hot salamander too close to the windbreak and there'll be no bonus for a job completed ahead of schedule.

It's an entirely different story when FIRE CHIEF-treated Canvas is used, because FIRE CHIEF *will not* support combustion. The war-proven FIRE CHIEF treatment *prevents* canvas from igniting. The unretouched photo at the left shows that even a welding torch cannot cause it to flame.



FIRE CHIEF has many other distinguishing qualities in addition to its fire resistance. It is also water, weather, wear and mildew resistant. It is flexible, year 'round, and it keeps its "dry" finish.

The unique FIRE CHIEF treatment is permanent. It will not bleach or wash out. FIRE CHIEF may be stored for indefinite periods and still retain *all* of its inherent qualities.

Weight for weight, FIRE CHIEF has a greater working strength, which permits the use of lighter grades. The Army has been taking advantage of this for its tents and ordnance covers . . . a considerable saving.

There is only one FIRE CHIEF treatment, thoroughly proven under all the rigors of war . . . a product of HOOPERWOOD "Canvas Engineering."

Many facts of utility to all users of canvas have been condensed into a new bulletin, "War-Proved for Post-War Service." Write for a copy.

WM. E. HOOPER & SONS CO.

New York **PHILADELPHIA** Chicago

Mills: **WOODBERRY, BALTIMORE, MD.**

• *Fire-Chief Finished* (PATENTED) •

HOOPERWOOD COTTON DUCK

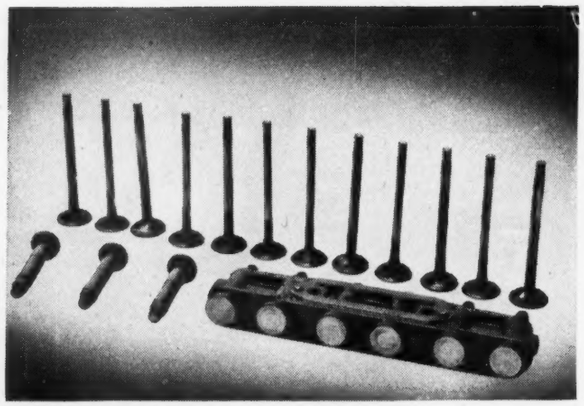
During 375,000 miles of freight line operation, engine records show:

no major overhauling needed

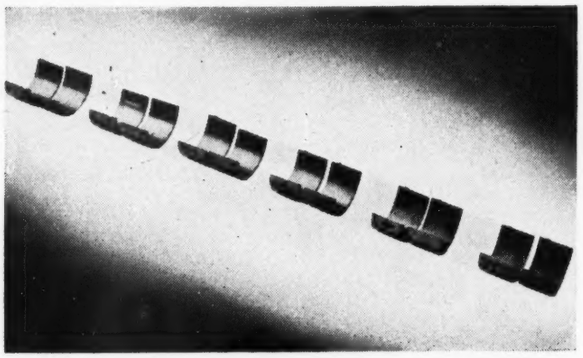
no bearing replacements

no valve grinding

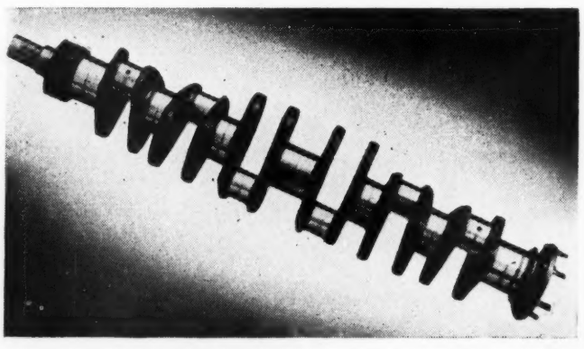
no piston or ring replacing



Valves, as they were taken from this engine after 375,000 miles of operation. None of these valves had been ground, and not any were burned. They were slightly dirty, but not sticking in the valve guides. Hydraulic valve lifters, shown in the foreground of the picture, were clean inside and all functioning normally.



Connecting rod bearings (copper-lead inserts) appeared to be in excellent condition. Wear measured only .002 inches. Main bearings (not shown) also had .002 inches maximum wear, and all bearings looked good enough to give additional mileage.



Crankshaft wear out-of-round measured .0025 inches maximum. There were no roughened or scratched crankthrows. Wear on cylinder walls was .008 to .010 inches. All except top compression rings were free, and the oil-control rings and oil-return holes were clean and clear.

THIS RECORD for low maintenance on 375,000 miles of truck operation was not a "staged" road test. It was made on the every-day grind of over-the-road freight hauling.

It started in March, 1941. Two truck-tractors—White, Model W. A. 120, powered by 6-cylinder engines—were put in service in a large Minnesota freight-hauling fleet. Both were started on Stanolube HD.

No special maintenance care was given these trucks over other equipment in the fleet. Crankcase and bearing inspection, oil and filter changes, and the usual ignition check were made regularly.

One truck is still in operation. Here is the record on the other truck, which was overhauled after 375,000 miles, at which time wear measurements were taken. After an inspection at 110,000 miles, an oil one grade heavier was used, but no replacements of bearings, pistons, or rings were needed. After 265,000 miles, an inspection showed that the engine was still unusually clean, and no replacements were needed. Finally, after 327,000 miles, test showed a slight loss of compression in some cylinders and some deposit formation. That was in January, 1944. It was decided to overhaul the engine whenever shop facilities and the truck were available.

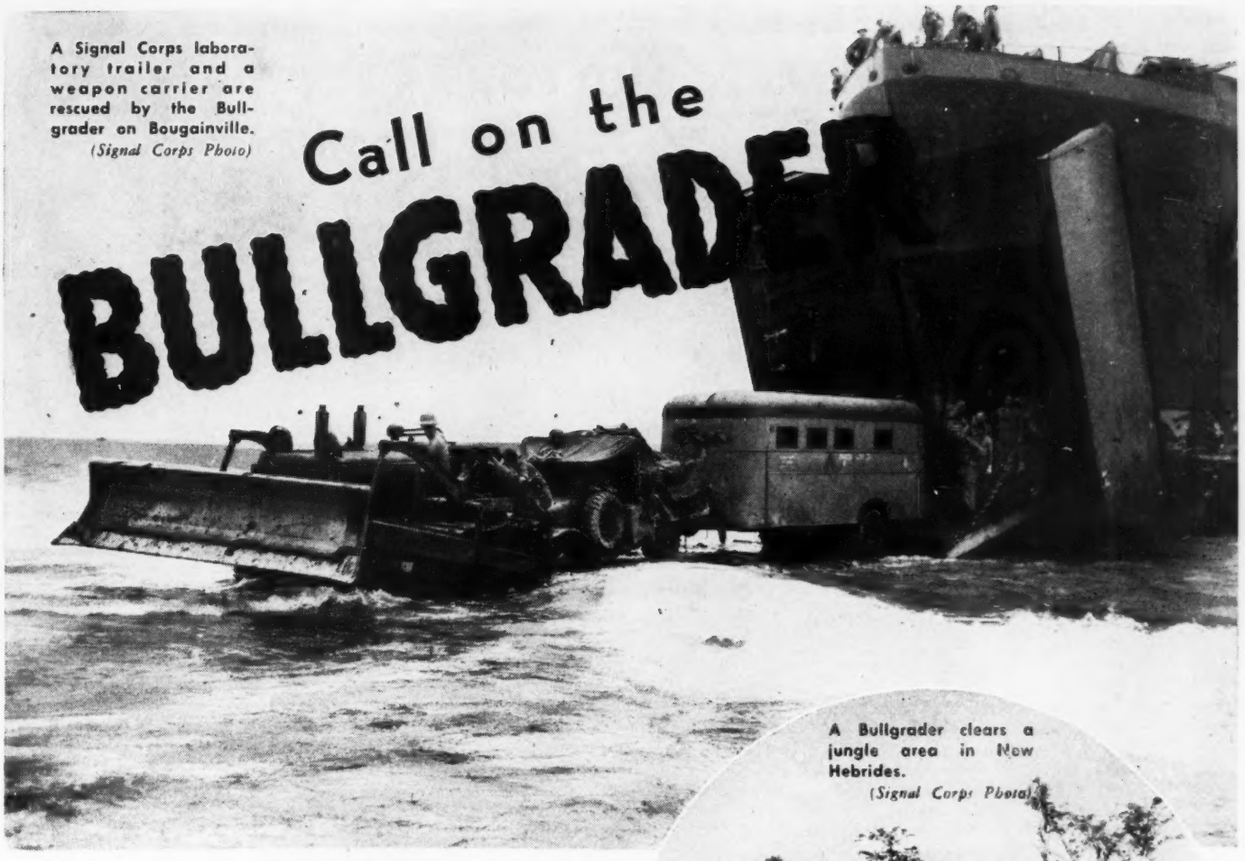
It was not until August, 1944—seven months and 48,000 miles later—that the work could be done. Mileage then totaled 375,000. The photographs of engine parts, and figures on the wear found at this time, are shown at the right.

Stanolube HD has helped many fleet operators make extraordinary records like this when fleet equipment was so badly needed. It may help you keep your trucks operating until replacements can be made. A Standard Oil Automotive Engineer will be glad to help you put Stanolube HD to work in your fleet. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, for the Engineer nearest you.

Gasoline Powers the Attack... Don't Waste a Drop!

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

★ **FLEET CONSERVATION SERVICE**



A Signal Corps laboratory trailer and a weapon carrier are rescued by the Bullgrader on Bougainville. *(Signal Corps Photo)*

Call on the BULLGRADER

A Bullgrader clears a jungle area in New Hebrides. *(Signal Corps Photo)*

In this war it's a habit to call on Bucyrus-Erie Bullgraders for fast work on a host of difficult jobs — from routing out buried pillboxes and 'dozing through shattered ruins to rescuing mired vehicles and clearing out jungle for agriculture. The speed and ease with which it handles its work makes this versatile unit a popular, efficient handyman.

What Bucyrus-Erie Bullgraders contribute in speed and efficiency to backing up the fighting man, they will give you on your postwar work. The inestimable value of a machine with ability to do many things well — that's what you get if you, too, call on the Bullgrader!

This Bullgrader cleans up debris of a demolished Jap refinery. *(Signal Corps Photo)*

N-80

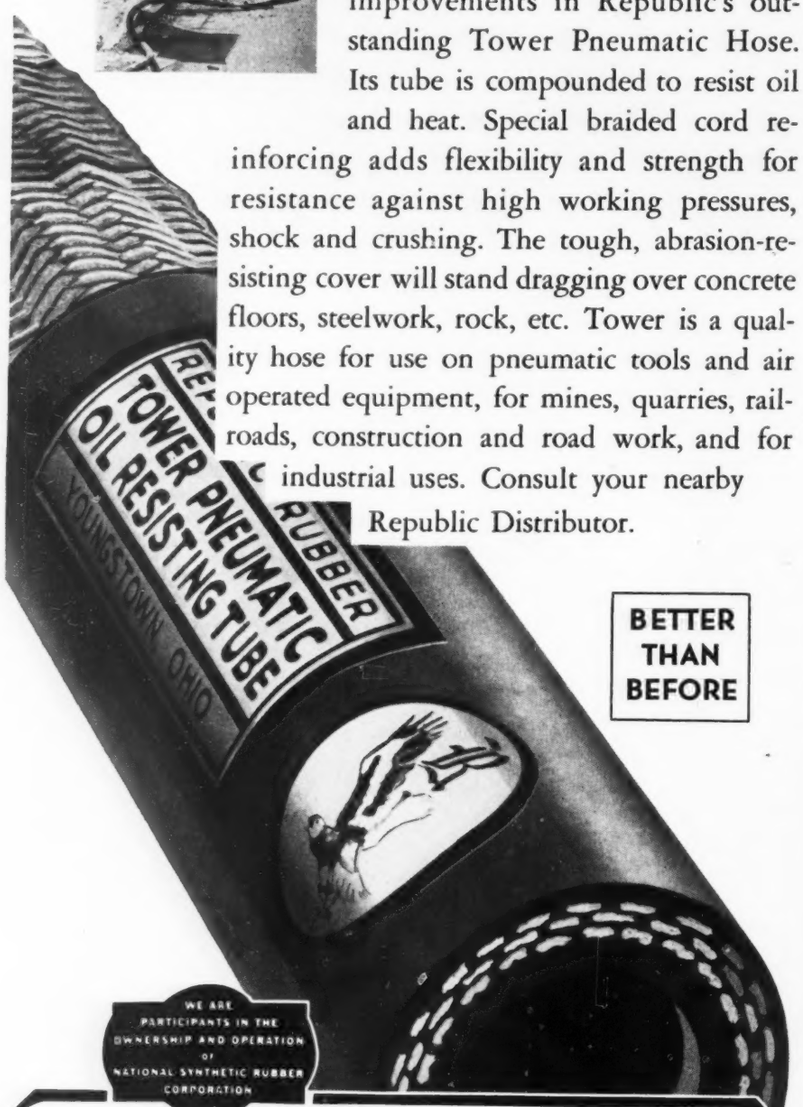
BUCYRUS ERIE
TRACTOR EQUIPMENT

ARMY NAVY

SEE YOUR INTERNATIONAL TRACTRACTOR DISTRIBUTOR

REPUBLIC HOSE
BUILT FOR *Service* AND FOR *Punishment*

Technological advances in synthetic rubber have made possible recent improvements in Republic's outstanding Tower Pneumatic Hose. Its tube is compounded to resist oil and heat. Special braided cord reinforcing adds flexibility and strength for resistance against high working pressures, shock and crushing. The tough, abrasion-resisting cover will stand dragging over concrete floors, steelwork, rock, etc. Tower is a quality hose for use on pneumatic tools and air operated equipment, for mines, quarries, railroads, construction and road work, and for industrial uses. Consult your nearby Republic Distributor.



BETTER THAN BEFORE

WE ARE PARTICIPANTS IN THE OWNERSHIP AND OPERATION OF NATIONAL SYNTHETIC RUBBER CORPORATION

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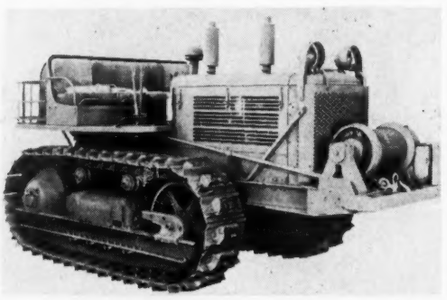
LEE RUBBER & TIRE CORPORATION
YOUNGSTOWN 1, OHIO

REPUBLIC INDUSTRIAL PRODUCTS
YOUNGSTOWN, O.

LEE DELUXE TIRES AND TUBES
CONSHOHOCKEN, PA.

FRONT-MOUNTED WINCH enables military vehicle to pull itself out of mud or shell holes or bomb craters without loss of efficiency characteristic of former methods of mounting where cable was passed over sheaves in order to obtain forward

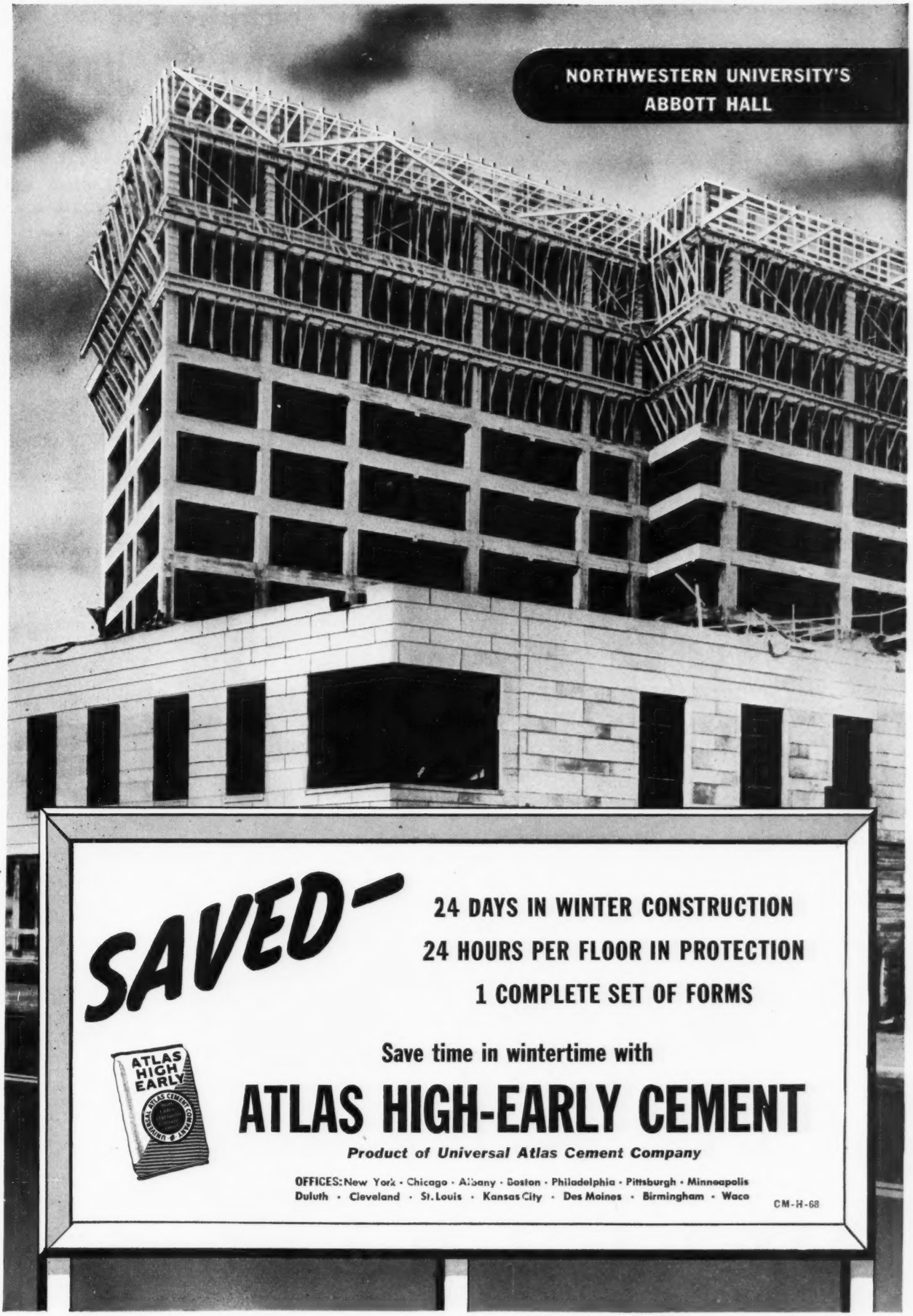


pulling power. With winch mounted in front of truck radiator, all that is necessary for successful operation is to run out a length of cable, attach it to a tree, large boulder or other available anchor and set winch in motion. As drum reels in steel cable, stalled vehicle is pulled forward and is soon restored to duty.—**Gar Wood Industries, Inc., 7924 Repelle St., Detroit, Mich.**

★ ★ ★

WELDING GOGGLE, said to provide better protection and greater comfort for welders' eyes has newly designed eyecups anatomically molded for right and left eye, with larger, more comfortable edges rounded to fit flush against contour of face. Eyecups also are shallow but with deep sides constituting best balance obtainable between proper height for wider vision and adequate protection. Improved nose fitting also said to add to comfort and safety. Side shields provide increased ventilation, keeping eyes cool and preventing fog-

ging of lenses. New style louvers prevent stray light rays or sparks from reaching eyes. Easily adjusted, non-slip one-piece headband resists oil, perspiration, water and grease. Ball-chain bridge covered with curved plastic tubing fits snugly over bridge of nose. Fitted with Noviweld lenses in 3, 4, 5, 6 or 8 shades. Optional equipment includes Filterweld lenses in 3, 4, 5, 6, 7 or 8 shades. Noviweld-Didymium lenses for absorbing yellow sodium flare in shades 3, 4, 5 and 6; or Super Armorplate Calobar lenses of medium, dark or extra dark shades for persons working near welding operations.—**American Optical Co., Southbridge, Mass.**


NORTHWESTERN UNIVERSITY'S
ABBOTT HALL
SAVED—
24 DAYS IN WINTER CONSTRUCTION
24 HOURS PER FLOOR IN PROTECTION
1 COMPLETE SET OF FORMS
Save time in wintertime with
ATLAS HIGH-EARLY CEMENT
Product of Universal Atlas Cement Company
OFFICES: New York · Chicago · Albany · Boston · Philadelphia · Pittsburgh · Minneapolis
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CONTROLS SPEED
BY ABSORBING POWER

THE HYDROTARDER IS ONE OF THE MAJOR ADVANCEMENTS OF THE MECHANICAL AGE!

The Parkersburg HYDROTARDER (hydraulic retarder), through its unique means of absorbing power through fluid friction, is applicable to any type of rotating equipment requiring brakes for dissipating power, or for controlling speed by absorbing power. Note below some of the profitable applications now in use.

Speed automatically governed . . . resistance created by fluid friction only . . just one moving part . . . no mechanical friction or wear . . does not operate under pressure.

TYPICAL APPLICATIONS:
Dynamometers
Engine Expansion Brakes
Decelleration Brakes
Gravity Conveyor Brakes
Gravity Monitor Brakes
Engine Loading Brakes
Running-In Brakes
Propeller Testing Brakes
Motor Vehicle Brakes

Write us your braking problem, addressing Dept. P

THE PARKERSBURG RIG & REEL COMPANY
Parkersburg, W. Va.

PARKERSBURG
Manufacturers of Quality Products Since 1897

NEWS FROM MANUFACTURERS
About Their Products

The publications reviewed below will keep you posted on latest developments in construction equipment and materials available for your use.

SPEED PRIME PUMPS—**Chain Belt Co.**, 1600 W. Bruce St., Milwaukee 4, Wis. (20 pp., illustrated.) Describes and illustrates these new self-priming units designed to fit wide range of pumping needs and lists following applications: (1) General dewatering service such as removal of water from flooded basements, excavations and sewers; (2) oil field uses such as supplying water to drilling rigs, handling mud, removing waste oil, transferring oil into and out of storage; (3) in irrigation service where large capacity at low head is essential; (4) in marine field as fire and bilge pumps where dependable and fast operation are requisites; (5) for utility work on estates, golf clubs and farms to provide an adequate supply of water for watering and drinking purposes and also to act as an auxiliary fire fighting unit; (6) in industry where these pumps have been used for a long time in handling many types of liquids. These pumps are made in sizes from 1½ to 8 in. with capacities ranging from 3,000 to 125,000 gph.

Degreasing Repair Parts

When cleaning motor blocks, transmissions, carburetors and other automotive parts, use SAFE, fast-working Oakite degreasing materials.

You'll find they speedily, thoroughly remove dirt, grease and oil . . . make inspection and repair work easier . . . provide dependable results that help you expedite servicing and reduce maintenance costs. Write TODAY for FREE booklet giving full details!

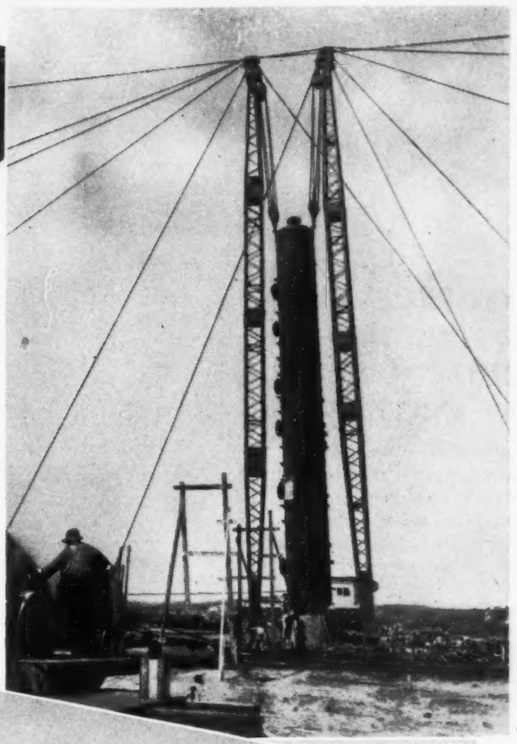
OAKITE PRODUCTS, INC.
24G Thames Street, New York 6, N. Y
Technical Service Representatives Located in All Principal Cities of the United States and Canada

OAKITE *Specialized* **CLEANING**
MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT

American

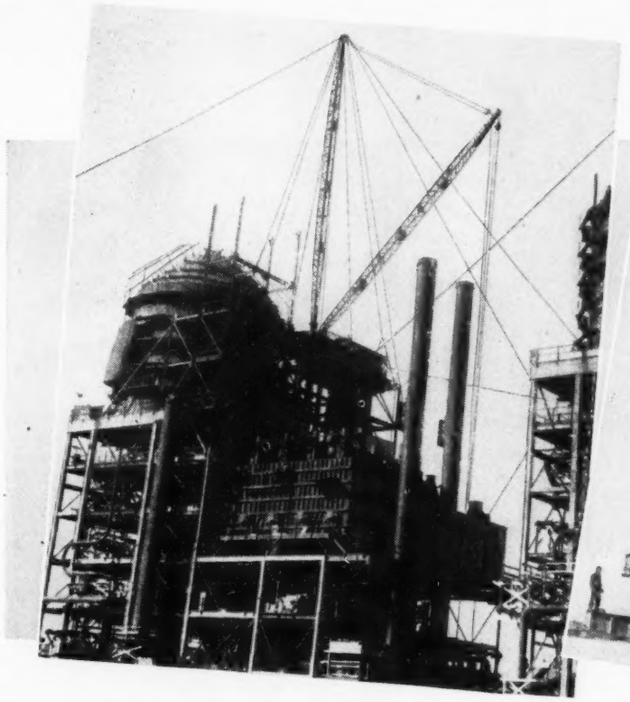
MATERIALS HANDLING FOR EVERY CONSTRUCTION JOB

DERRICKS



How up to date are your materials handling methods for the big derrick jobs? And, there is going to be a lot of this heavy work. Progressive contractors on this type of construction know from experience the advantages of an AMERICAN Derrick.

Whatever your derrick requirements, there is an AMERICAN for you. Guy, Stiffleg, Steel Erector's, Gin Poles, Gallows Frames, and Derricks of special type with a choice in size and lifting capacity offer versatility for heavy work.



4502

Plan now . . . but wait for **AMERICAN!**

AMERICAN MATERIALS HANDLING *for* EVERY INDUSTRY

AMERICAN HOIST & DERRICK CO.

Saint Paul 1, Minnesota

CHICAGO SAN FRANCISCO NEW YORK

Wherever wire rope is fastened . . . . use genuine **CROSBY CLIPS** *with the Red-U-Bolt*

When You're Pouring Concrete, Use . . .

SISALKRAFT

OVER THE SLAB . . . TO CURE AND PROTECT FROM DRIP AND DEBRIS

Waterproof, tear-resistant, scuff-proof SISALKRAFT retards evaporation and protects the concrete from dirt, dripping grout and debris.

ALL AROUND THE JOB FOR PROTECTION FROM FROST

Used all around the building, SISALKRAFT holds in the heat from salamanders or other heating units. On the large building job illustrated, the SISALKRAFT blankets are all in place, despite a gale that lasted 24 hrs.

For nearly 25 years the unmatched performance of SISALKRAFT has made it the Number One concrete curing and protecting agent. Use it when you're pouring concrete — for buildings, runways and roads.

THE SISALKRAFT CO.
205 W. WACKER DRIVE · CHICAGO 6, ILL.
NEW YORK · SAN FRANCISCO · LONDON · SYDNEY

Manufacturers of SISALKRAFT, FIBREEN, SISAL-X, SISALTAPE AND COPPER-ARMORED SISALKRAFT

STEEL MINE TIES—**Koppers Co.,** Wood Preserving Div., Pittsburgh, 19, Pa. (8 pp., illustrated) Method of accomplishing a 40-per cent monthly saving in tie costs by mines using Koppers Ar-Moored steel ties instead of untreated timber ties is subject of this folder. These ties are constructed with a creosote pressure-treated oak base to which is fitted a Bethlehem Steel mine tie secured to the wooden base with special nuts and bolts. Available in 2-, 3-, and 4-in. bases and supplied either with staggered or outside stationary clips. Suitable for use in temporary track for working sections and for main-line haulage, inside mine or out. When sections are worked out, ties can be quickly recovered and relaid without bending, distortion or spike-kill. Ties maintain track gage, permanently eliminating need for gage rods or tie forks when track is being laid. Mine accidents and injuries are said to be avoided as track stays in line "ballasted" with wood. Tests of Ar-Moored ties show, according to their makers, that they reduce installation costs by half, or more, require no expenditure for spikes and have a conservatively figured average life of from 8 to 20 yr., depending on the character of the service as compared with 12 months to 4 or 5 yr. for untreated timber ties.

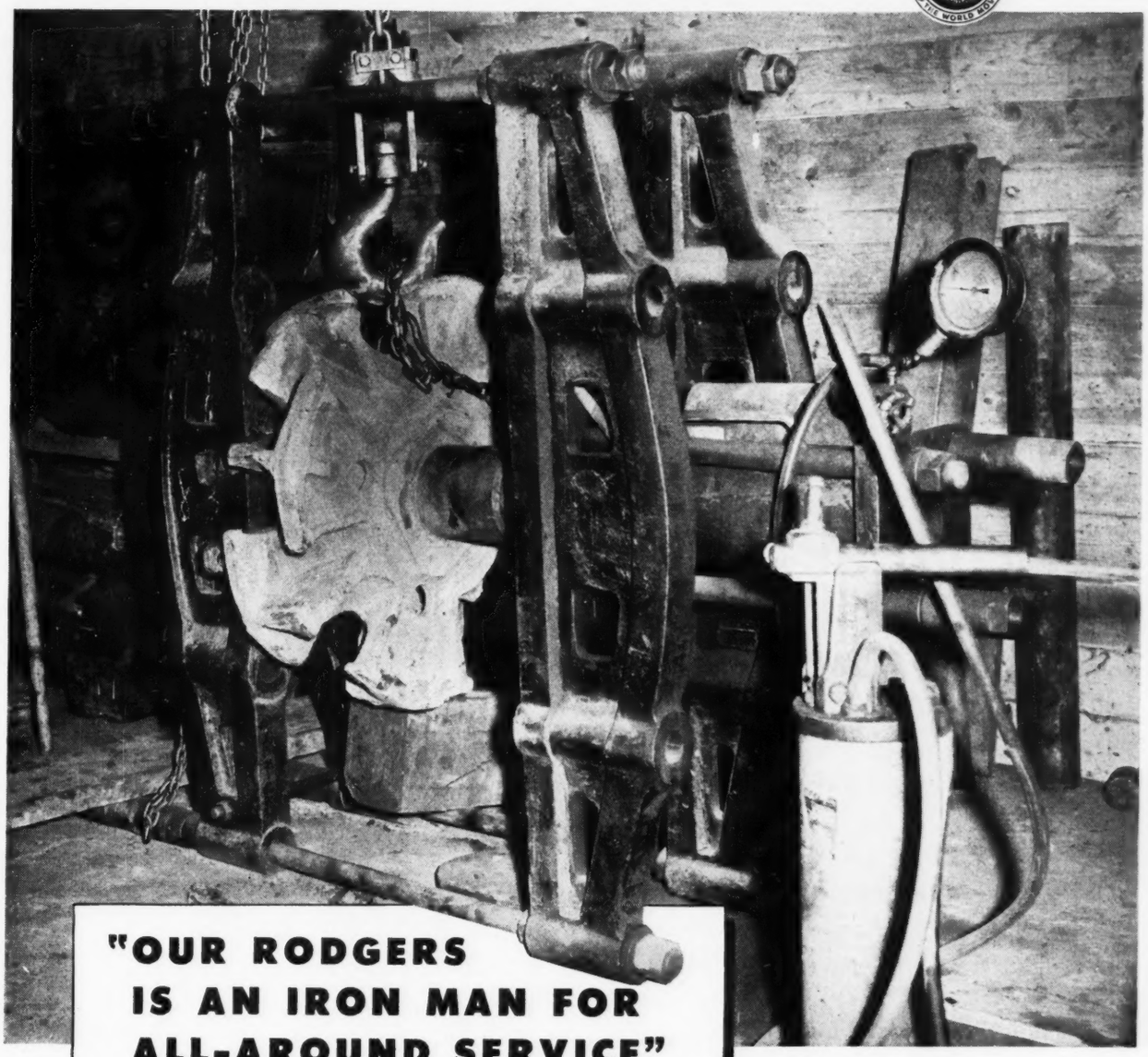
★ ★ ★

LUMINESCENCE—**The New Jersey Zinc Co.,** 100 Front St., New York, 7, N. Y. (24 pp., illustrated) Gives clear picture of luminescence by discussing in simple ABC language the characteristics, properties, limitations and applications of the inorganic pigments, as well as the terms applicable to this industry. Number of tables and charts are included to illustrate such terms as "the dark-adapted eye" and "the decay of afterglow."

Light enough to handle . . heavy enough to "take it". These HIGHLY PORTABLE CMC's have proven their durability and sturdiness on important jobs all over the world. They are "first choice" Mixers in peace or war. All standard sizes. Get information.

CONSTRUCTION MACHINERY CO.
Waterloo, Iowa
Mixers • Pumps • Hoists • Batching & Placing Equipment • Saws • Carts • Barrows

NO. 23 OF A "READY-WITH-A-RODGERS" SERIES



"OUR RODGERS IS AN IRON MAN FOR ALL-AROUND SERVICE"

Pulling a Diesel shovel sprocket gear at the mine with a Rodgers Universal Press.

"Open-pit iron mining punishes equipment, so our Rodgers Universal Press sees plenty of action. And travel, too — we operate mines miles apart, and shuttle the Rodgers back and forth by light truck.

"We've saved hundreds of hours by taking the press to the job. For example, using the track servicing attachment, we service our crawlers right down in the pit. Both on the job and in the shop, our Rodgers keeps saving us layup time and money on overhauls and repairs."

From the Minnesota iron country comes this report on another Rodgers Universal Press that is doing a whale of a job servicing equipment. The Rodgers Universal can be used wherever portable pulling or pressing power is needed. *If it's a Rodgers, it's the best in hydraulics.* For complete information and prices, write or wire Rodgers Hydraulic, Inc., 7403 Walker Street, St. Louis Park, Minneapolis 16, Minnesota.

***Uses for* RODGERS UNIVERSAL HYDRAULIC PRESS**

Gear Pulling • Wheel Press Work • Jacking Pipe • Erecting Machinery • Relocating Machinery • All-Purpose Jack

RODGERS HYDRAULIC, Inc.

There's been a big change

★ Imagine going places in a horse-drawn hack, when the tempo of the times demands a modern taxi!

The ever-increasing tempo of transportation, industry and agriculture demands a tapered roller bearing with greater capacity and longer life. Tyson found the answer—developed a bearing with thirty percent more load-carrying rollers around the raceway.

More rollers, more capacity. More rollers, longer life. More rollers, increased rigidity. The Tyson "All-Rolls" Bearing is hailed as the sturdiest and longest-lived bearing ever built for heavy-duty service.

The big name in bearings today is . . . **TYSON!**

TYSON BEARING CORPORATION • MASSILLON, OHIO

COUNT THE ROLLS • THE ROLLS COUNT

Tyson

TODAY'S HEAVY-DUTY BEARING

★ BUY MORE WAR BONDS ★

After VICTORY

We enter the new year with a profound feeling that Victory is not far away—that soon LIMA Shovels, Cranes and Draglines will be coming off the assembly lines ear-marked for peacetime operation.

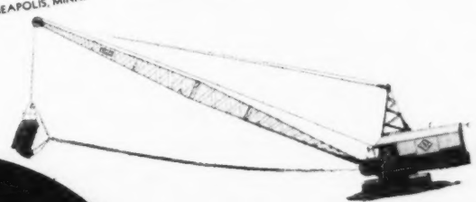
When peacetime comes LIMA will have a line of Shovels, Cranes and Draglines that will be especially designed and built for the big jobs that you have planned for the future. This war has provided a tough proving ground for excavators and material handling equipment. It has brought to the forefront the ruggedness and dependability of LIMA-MADE equipment, built to perform under extreme pressure. As their wartime task continues, LIMA engineers continue to make improvements in design and construction that you may have, after Victory, the best shovels, cranes and draglines built.

LIMA LOCOMOTIVE WORKS, INCORPORATED

LIMA, OHIO, U. S. A.

Shovel and Crane Division

NEW YORK, N. Y. · PHILADELPHIA, PA. · MEMPHIS, TENN. · ST. LOUIS, MO. · NEWARK, N. J.
DALLAS, TEXAS · SEATTLE, WASH. · SAN FRANCISCO, CALIF. · LOS ANGELES, CALIF. · SPOKANE, WASH.
PORTLAND, ORE. · MINNEAPOLIS, MINN. · MONTREAL, QUEBEC, CANADA · VANCOUVER, B. C.

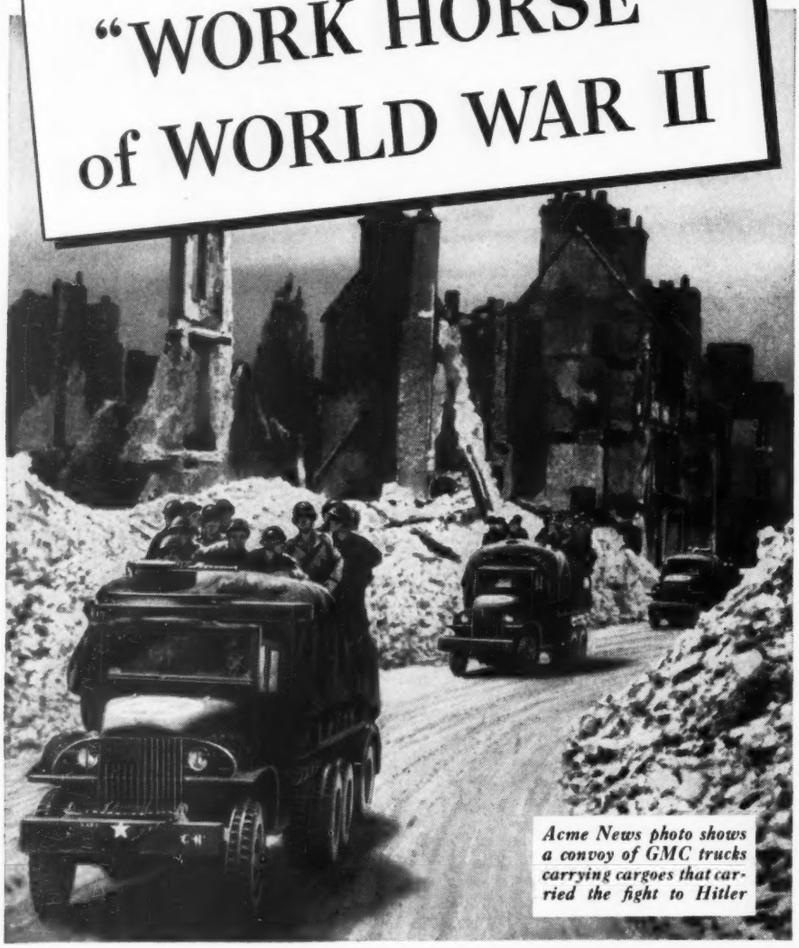


LIMA

Shovels-Cranes
Draglines

A Type and Size
FOR EVERY JOB

"WORK HORSE" of WORLD WAR II



Acme News photo shows a convoy of GMC trucks carrying cargoes that carried the fight to Hitler

When a high-ranking Army Officer recently referred to the GMC 2½-ton "six-by-six" military truck as the "Work horse of the War," no name was ever more appropriately applied.

It works for the Artillery pulling guns and carrying ammunition. It helps the Engineers repair roads, bridges and damaged defenses. It works for the Signal Corps carrying poles and wire and radio equipment. It helps Ordnance repair tanks and trucks and arms of all types. It works for the Transportation and Quartermaster Corps transporting everything it takes to keep an Army on the offensive. It performs equally essential service for the Navy, Marines, Air Forces and Coast Guard.

Is it any wonder, then, that our fighting forces have already requested and received more than 450,000 GMC military vehicles . . . that thousands more are going into the Service each month!

In addition to being one of the largest producers of military vehicles, GMC is also building many commercial trucks for essential users. If you are eligible for a new truck, your GMC dealer will gladly help you fill out an application. Remember, too, that GMC is headquarters for the original truck-saving Preventive Maintenance Service.

INVEST IN VICTORY
BUY MORE WAR BONDS

GMC TRUCK & COACH DIVISION
GENERAL MOTORS

HOME OF COMMERCIAL GMC TRUCKS AND GM COACHES
VOLUME PRODUCER OF GMC ARMY TRUCKS AND AMPHIBIAN "DUCKS"

V-BELT DRIVES (industrial fractional horsepower)—**The B. F. Goodrich Co.,** Akron, Ohio. (44 pp., illustrated) Booklet notes the trend toward larger sheaves in both fractional horsepower and multiple V-belt drives and gives prices and data on both sheaves and belts. Chapter on proper selection of FHP belt drives, with formulas, together with a page on how to get the most service from these units. Horsepower ratings and general engineering data on these drives are given, together with 27 pages of selection tables of stock drives using pressed steel and cast-iron FHP single groove sheaves and adjustable cast-iron single groove sheaves.

★ ★ ★

200 Bituminous Repaving Contracts

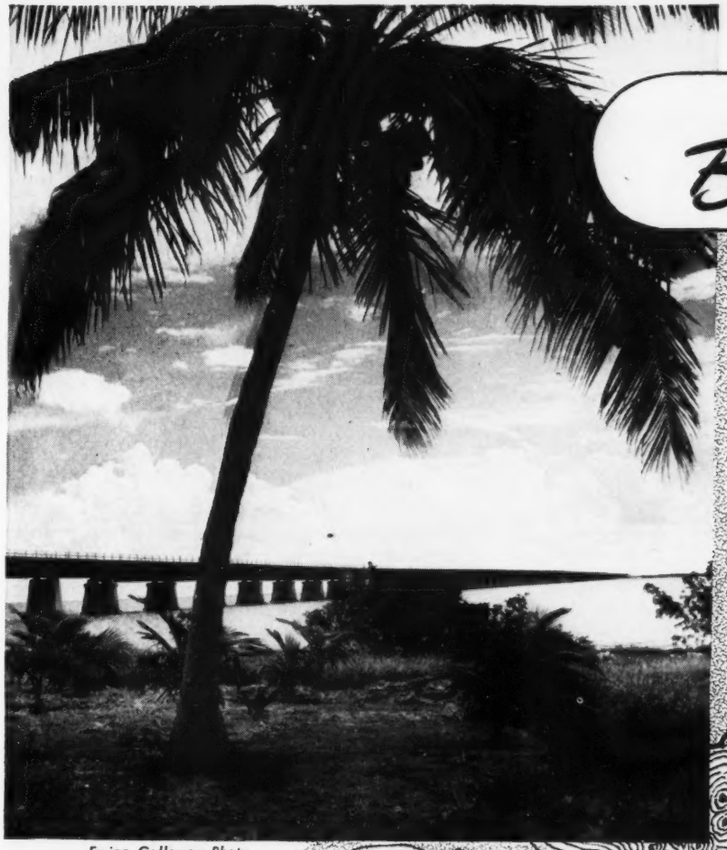
(Continued from page 93)

kinds were active throughout the construction season from May to November, during which an average of 30 to 36 contracts was in active progress at all times.

Speed and Quality—No time is lost these days on bituminous repaving jobs, according to William T. Morrissey, division engineer of highways in the Public Works Department, who compares today's speed and superior pavement quality with the slower and less reliable hand-labor methods of several years ago. A typical schedule for a 2,000-2,250-sq.-yd. paving job in 1944 called for completion in 5 working days: 2 days with a power excavator to dig up the existing pavement 6 to 8 in. deep; 1 day for a grader to strike off the sub-base to profile; 1 day to spread stone with the same grader and apply asphalt with a pressure distributor for 4-in. penetration macadam base; and 1 day to place binder course and top course for a total depth of 2¼ in., using a bituminous paver to to spread the material and a power roller to compact it. Construction at this speed almost eliminates interference with business in the block during the repaving work. At the same time, accurate mechanical control of the construction operations makes it possible to obtain high, uniform quality in the pavement.

Of ten permanent asphalt mixing plants in the Boston area, only two operated during 1944 to supply the required quantity of about 70,000 tons of bituminous paving mixes for the city's repaving program. All contractors bought their materials from these two plants, owned by the National Contractors Co. and the Old Colony Crushed Stone Co. On a number of projects, the material

(Continued on page 120)



Ewing Galloway Photo

AMERICA IS

Built with Aggregate!

The Highway that goes to sea...

Stretching apparently endlessly out to sea runs the Key West Highway Viaduct, one of the world's great engineering feats. Every foot of its more than one hundred and thirty miles is strong enough to withstand nature's most destructive forces because it's built primarily of aggregate.

On highways, airports, dams and other permanent structures which also require enormous quantities of aggregate, the difference of even a few cents per ton in material costs becomes highly important. Because of this, Iowa engineers are constantly striving to improve the Cedarapids line to provide every possible advantage for its users to produce better products at still lower cost.

No matter what kind of a job you are supplying material for you'll profit more by using Cedarapids equipment. Iowa is known everywhere as headquarters for aggregate producing and crushing equipment and asphalt plants.

IOWA MANUFACTURING COMPANY
CEDAR RAPIDS, IOWA

Cedarapids
Built by IOWA

THE IOWA LINE

of Material Handling Equipment Includes

ROCK AND GRAVEL CRUSHERS
BELT CONVEYORS—STEEL BINS
BUCKET ELEVATORS
VIBRATOR AND REVOLVING SCREENS
STRAIGHT LINE ROCK AND GRAVEL PLANTS
FEEDERS — TRAPS
PORTABLE POWER CONVEYORS
PORTABLE STONE PLANTS
PORTABLE GRAVEL PLANTS
REDUCTION CRUSHERS
BATCH TYPE ASPHALT PLANTS
TRAVELING (ROAD MIX) PLANTS
DRAG SCRAPER TANKS
WASHING PLANTS
TRACTOR-CRUSHER PLANTS
STEEL TRUCKS AND TRAILERS
KUBIT IMPACT BREAKERS

BUILT-IN QUALITIES
PROVED IN SERVICE ON-THE-JOB!

HEAVY DUTY PROTECTION

+

LIGHTWEIGHT ***WEARING EASE***

SKULLGARDS

Long used by the construction industry in years of peace, M.S.A. Skullgard Protective Hats are serving the war effort in very great numbers wherever essential construction is in progress—first choice of management for demonstrated higher protection and unequaled durability—favorite of the worker for lightweight, easy going comfort throughout each working period.

High-pressure molded of laminated bakelite, M.S.A. Skullgards are hard and tough. With extremely high resistance to fracture, Skullgards protect against falling or flying head hazards and the general blows and bumps which may be encountered in construction projects. Possessing high dielectric properties, Skullgards are immune to the effects of moisture, can't swell, soften or gain in weight, and do not deteriorate from contact with perspiration, oils, greases, acids or alkalies. Available in a range of hat and cap styles, M.S.A. Skullgards are furnished in all standard head sizes. Write for the descriptive Skullgard Bulletin!

MINE SAFETY APPLIANCES COMPANY
BRADDOCK, THOMAS AND MEADE STREETS, PITTSBURGH, PA.
District Representatives in Principal Cities

(Continued from page 118)

suppliers also laid and rolled the bituminous pavement.

Pavement Types

As pointed out by George G. Hyland, commissioner of public works, Boston has about 710 mi. of streets, of which about 40 mi. was repaved during 1944. Practically all repaving in the city is bituminous, in accordance with experience which demonstrates that this type is most serviceable for Boston streets. The pavement specifications of the Public Works Department contain separate sections for bituminous concrete, bituminous concrete base and sheet asphalt. In addition, they include provisions admitting seven patented types of hot- and cold-mix bituminous concrete, which are acceptable to the department when designated for specific projects.

Most widely used of the city's bituminous concrete mixes is Type I-1, indicated by an accompanying tabulation showing the composition of mixtures for binder course and top course. Specified composition of the city's sheet asphalt is shown in another table. Specifications allow for the hot-laid bituminous con-

(Continued on page 122)

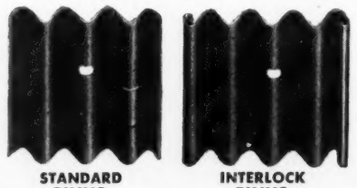
Now

CORRUGATED
STEEL SHEET PILING
. . . is Easier To Get

Yes! Restrictions have been modified, priority ratings are lower, and you can again use the famous CORRUGATED Steel Sheet Piling, either standard or interlocking type, for the construction jobs you are figuring on.

CORRUGATED Steel Sheet Piling is strong, watertight, easy-to-handle, easy-to-transport and has unusually high salvage value . . . ALL IMPORTANT FEATURES.

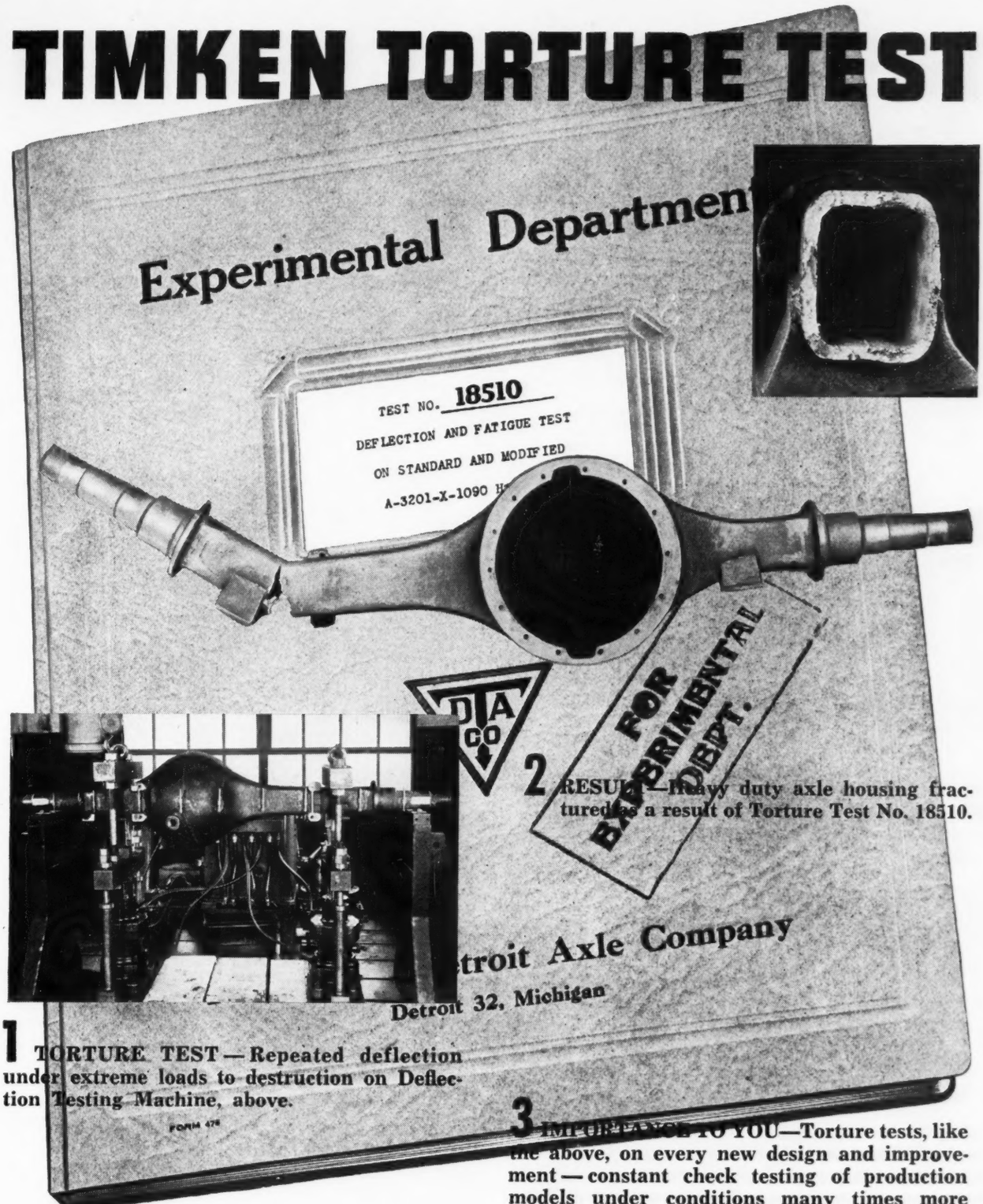
Use it for bridges, dams, locks, sewage disposal plants, docks, levees, bulkheads, and any other big or little job where lightweight steel or wood piling is required. Send for specifications, catalog and priority facts today.



STANDARD PILING — INTERLOCK PILING

CAINE STEEL CO.
1820 North Central Ave., Chicago 39, Ill.

TIMKEN TORTURE TEST



1 **TORTURE TEST — Repeated deflection under extreme loads to destruction on Deflection Testing Machine, above.**

2 **RESULT — Heavy duty axle housing fractured as a result of Torture Test No. 18510.**

3 **IMPORTANCE TO YOU—Torture tests, like the above, on every new design and improvement — constant check testing of production models under conditions many times more severe than will ever be encountered in service — insure greater reliability and stamina in every Timken Axle.**

TIMKEN AXLES The Accepted Standard D T A CO

TIMKEN AXLES

THE TIMKEN-DETROIT AXLE COMPANY, DETROIT 32, MICHIGAN
WISCONSIN AXLE DIVISION • OSHKOSH, WISCONSIN

CLIP THIS ADVERTISEMENT

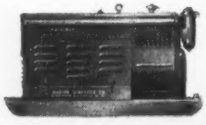
Send for literature on items checked

☐ Concrete Surfacing Attachments for all needs

☐ Gas or Electric Concrete Vibrators to meet every placing requirement

☐ Vibratory Concrete Finishing Screeds . . . Models: VS-6 ft.; VS-10 ft.; VS-13 ft.; VS-16 ft.; VS-20 ft.; VS-25 ft. adjustable for lengths . . . strike off and compaction in one easy operation.

☐ Portable AC or DC Gas Electric Generator Sets to meet all power, lighting requirements, ½ to 17 KW. Open or housed models.



SPEED YOUR WORK
SAVE MANPOWER
with Master Equipment
"PREFERRED THE WORLD OVER"

Power, portability, simplicity and built-in dependability distinguish all Master Vibrator Company equipment . . . make it the choice of thousands of engineers and contractors wherever work must be done fast, efficiently and at lowest operating and manpower cost. *Immediate delivery.*

Write for literature at once!

☐ Full line of Flood and Shovel Lights (not illustrated).

☐ Electric "Power Blow" Hammer and Tools for heavy or light duty work. Model 650 Generator Plant to operate hammer when electricity not available.

MASTER VIBRATOR COMPANY

Dayton 1, Ohio • Distributors throughout United States and Canada

Products Include: Concrete Vibrators Gas or Electric Surfacing Attachments, High Speed Tools • Vibratory Concrete Finishing Screeds • Rotary Concrete Floor Finishing Machines • Portable Gas Electric Generator Plants, 500 Watt to 17000 Watt, Voltage Regulators and Portable Mountings Optional • Master Flood and Shovel Lights • Electric or Gas Engine Driven Power Blow Hammers

Clipper
MASONRY SAWS
A special shape or shorter length need only be as far away as your Clipper Masonry Saw. The basic feature of Clipper is the new multiple cutting principle . . . . a method developed especially for Masonry Materials. You can be sure to cut with the fastest cutting speed and to obtain the longest blade life. Write for Catalog.
CLIPPER
MANUFACTURING CO.
4037 Manchester St. ST. LOUIS, MO.

(Continued from page 120)

crete, Type I-1, asphalts with penetrations of 60 to 85 or of 85 to 100. For the sheet asphalt, the asphalt penetration may be either 50 to 60 or 60 to 70.

BOSTON PUBLIC WORKS DEPARTMENT

COMPOSITION OF MIXTURES

Hot-Laid Bituminous Concrete Type I-1

SQUARE OPENING SIEVES		PERCENT BY WEIGHT			
		Binder Course		Top Course	
Passing	Retained On	Min.	Max.	Min.	Max.
1″		100			
1″	¾″	0	5		
¾″	½″	40	65		
¾″				100	
½″					
½″	No. 4	10	25	20	60
No. 4	No. 10	5	15	30	45
No. 10		15	30		
No. 10	No. 20			4	15
No. 20	No. 40			4	16
No. 40	No. 80			6	20
No. 80	No. 200			5	16
No. 200				4	9
Bit. sol. in CS_2		4	6	5	
Sheet Asphalt					
1″		100			
1″	¾″	0	5		
¾″	½″	40	65		
½″	No. 4	10	25		
No. 4	No. 10	5	15		
No. 10		15	30		
No. 8				0	5
No. 10	No. 20			2	12
No. 20	No. 30			4	12
No. 30	No. 40			4	20
No. 10	No. 40			10	35
No. 40	No. 50			4	25
No. 50	No. 80			4	35
No. 40	No. 80			15	50
No. 80	No. 200			10	35
No. 200				10	
No. 80 and	No. 200			25	
Bit. sol. in	CS_2	4	6	10	12

★ ★ ★

New Calculator Determines Welding Temperatures

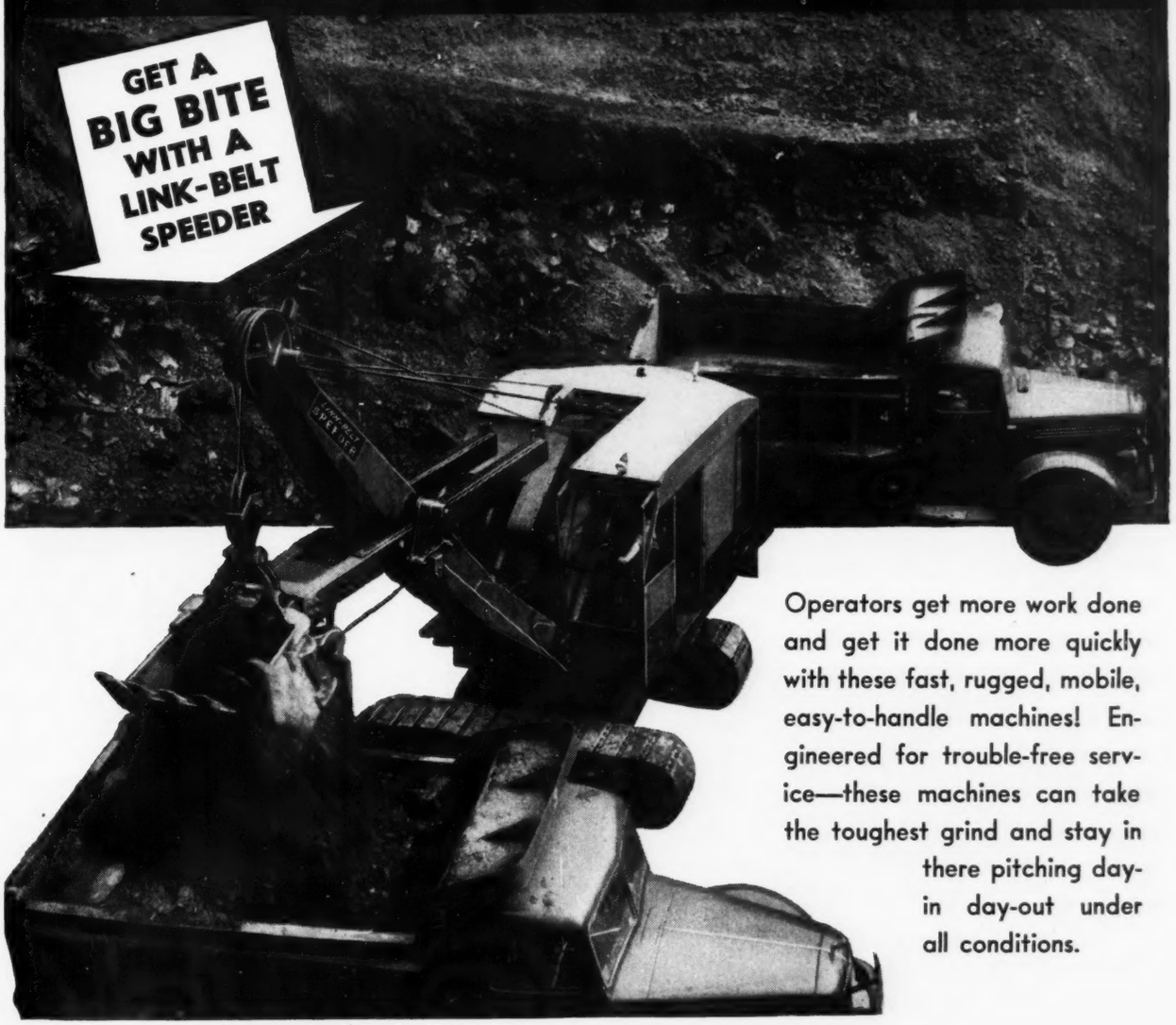
A NEW CALCULATOR, designed for readily determining the welding preheating and interpass temperatures of steels in those few cases where experience indicates the need for preheating to obtain best welding results, has been announced by The Lincoln Electric Co., Cleveland, Ohio.

This useful calculator is 6¼ inches in diameter and consists of four movable sections of heavy cardboard stock. Complete instructions in the form of six simple steps are printed on the outside sections.

Although most steels are readily weldable and require no preheating because of low carbon and alloy content, this calculator will serve as a convenient guide in instances where steels have a higher content of carbon and other alloys and require preheating to minimize the ten-

(Continued on page 124)

TO KEEP UP WITH A
LINK-BELT SPEEDER
TRUCKS MUST MOVE FAST!



Operators get more work done and get it done more quickly with these fast, rugged, mobile, easy-to-handle machines! Engineered for trouble-free service—these machines can take the toughest grind and stay in there pitching day-in day-out under all conditions.

For Prompt, Efficient, Convenient Sales and Service There Is a Link-Belt Speeder Distributor Located Near You

9771

LINK-BELT SPEEDER

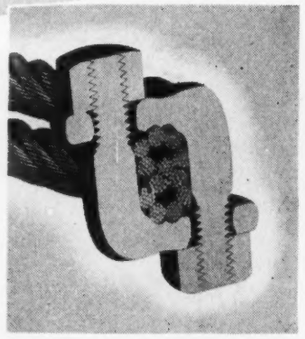
Builders of the Most Complete Line of
SHOVELS-CRANES-DRAGLINES

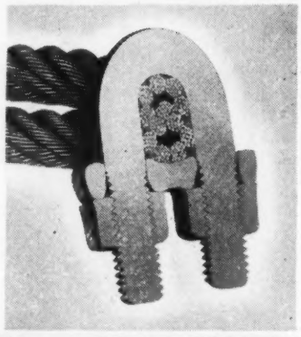
LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO-9, ILL.
(A DIVISION OF LINK-BELT COMPANY)

TREAT YOUR PREFORMED WIRE *Right*

RIGHT AND WRONG WAY TO HOLD WIRE ROPE

Examine these cross-section views of a "Fist-Grip" Safety Clip and "Finger-Pinch" U-bolt. (Each tightened to exactly the same tension with a torque-indicating wrench). Notice how the "Fist-Grip" clip holds the rope evenly with only the slightest flattening . . . how the U-bolt crushes the rope out of shape as evidenced by the distorted hemp center under the "U".



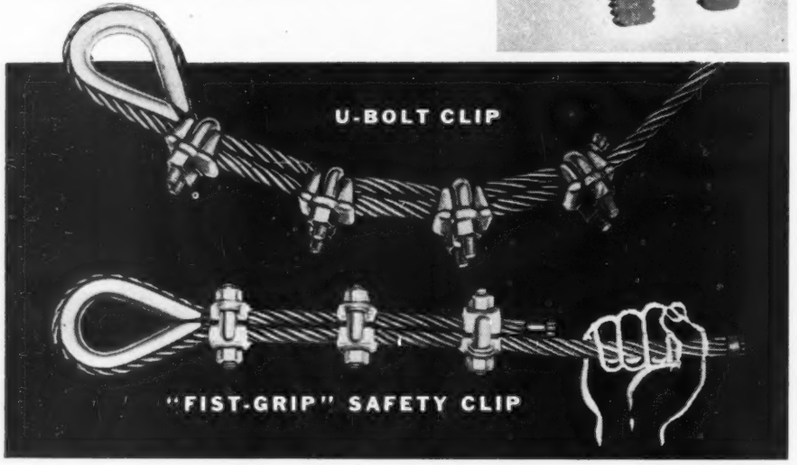


"PREFORMED" ROPE DESERVES "FIST-GRIP" CARE

When you pay extra for the advantages of "Preformed" rope, protect your investment by using Laughlin Safety Clips that keep ropes straight and strong. Get these other features too . . . the only clips with drop-forged bolts — 3 do the work of 4 U-bolts — they can't be put on backwards.

If you haven't tried "Fist-Grip" Clips . . . purchase a few to test. See how much faster they can be installed . . . how much better they work . . . how much you save in clips, time and money.

Distributed through mill, mine and oil field supply houses. Send for Laughlin's catalog of wire rope and chain hardware. Address Dept. 1, The Thomas Laughlin Co., Portland 6, Maine.



LAUGHLIN

THE MOST COMPLETE LINE OF DROP-FORGED WIRE ROPE AND CHAIN FITTINGS

(Continued from page 122)

dency toward excessive hardening and possible cracking of the base metal adjacent to the weld.

CALCULATOR for determining welding preheat and interpass temperature.

The calculator, available through The Lincoln Co., is priced at 25c., postpaid, anywhere in the United States; 50c., elsewhere.

Shunk *Snow Plow and Ice Removal* **BLADES**

Proved record of superior performance. Made of specially developed steel to withstand severe service conditions.

FOR ALL TYPES AND MODELS OF SNOW PLOWS

Various widths, lengths, thicknesses--flat or curved--standard or special--punched ready to fit your machine.

SHUNK SAW-TOOTH ICE BLADE

Amazingly effective. Thoroughly breaks up and removes heavy, slippery ice and snow formations. Replaces all types of snow plow blades or maintenance units. Write for Bulletin and name of nearest Distributor.

Shunk

MANUFACTURING COMPANY

ESTABLISHED 1854

BUCYRUS, OHIO.

MONOTUBES
Designed for Men Who Install Piled Foundations

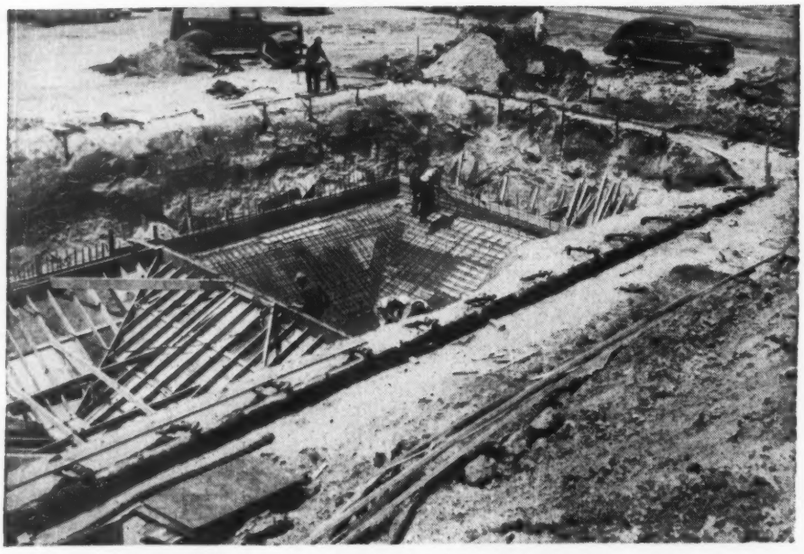
MONOTUBES—the all-steel tapered piles—are on the job helping engineers and contractors build better foundations for war or peace.

Their light weight makes Monotubes easy to handle on the job. Their tapered, fluted construction permits fast driving with average job equipment, and without heavy core or mandrel. Their tubular design simplifies inspection prior to concreting. And, best of all, they can be quickly and easily extended on the job to meet any contingencies of varying soil conditions.

Remember these special advantages the next time you require piled foundations . . . remember Monotubes. Available in a gauge, size, and taper to meet all needs. Free Catalog 68A gives complete information. Write The Union Metal Manufacturing Company, Canton 5, Ohio.

UNION METAL
Monotube Tapered Piles

A Griffin Wellpoint Job



Predraining DENSE Soil is EASY for GRIFFIN

WATER level was lowered from the surface a total of 17 feet by Griffin in this job. Note the way the banks were cut to stand on a steep slope—that means dense stuff, hard to get the water out—if you don't use Griffin Equipment. And so dry was the job that they needed no additional Wellpoints to dewater an excavation 75 feet from the above. Results count—why say more?

●

For Sale and for Rent

MID-WEST

GRIFFIN EQUIPMENT CO., INC.
548 Indiana Street • Hammond 1662
HAMMOND, INDIANA

SOUTH

GRIFFIN ENGINEERING CORP.
633 N. Myrtle Ave. • Jacksonville 5-4516
JACKSONVILLE, 4, FLA.

MAIN OFFICE: 881 EAST 141st STREET, NEW YORK 54, N. Y.

GRIFFIN WELLPOINT CORPORATION

Bituminous Resurfacing

(Continued from page 79)

greater quantity of material was available under the contract, and the weight of the top course was increased to 95-96 lb. per sq.yd.

Widening and Resurfacing—Preparatory to resurfacing, the existing 16-ft. concrete pavement was widened to 20 ft. (21 ft. at the sharper curves) by construction of edge strips of broken stone filled with stone screening, placed in two 3-in. compacted layers. After being compacted, the surface of the widening strips was primed with ¼ gal. per sq.yd. of tar.

For resurfacing the full width of the pavement, asphalt mixes meeting the specifications were delivered by the contractor to a 1944 model Adnun black top paver equipped with hydraulic controls and designed to lay widths of 7 to 12 ft. On this project, the machine spread and struck off the material 10 ft. wide for both binder course and top course. When placing binder, the mixing plant de-

WATER FOR WETTING ROLLERS of bituminous paver is pumped from truck into tank on machine during noon lull between truckloads.

livered an average per day of 350 tons, which was put down in about 8½ hr. operating time. The paving machine was capable of handling much greater volume.

Behind the paver, a Huber 10-ton three-wheel roller and a Galion portable unit, mounting a compression roll filled with water, compacted the paving material in each course with about six rollings. Pressure under the portable

(Continued on page 130)

HOW A B-G BUCKET LOADER CUTS COSTS FOR THE CONTRACTOR!

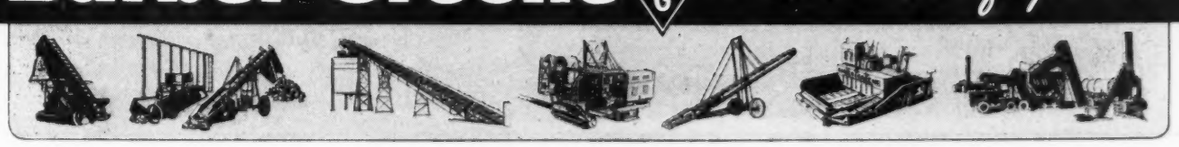
• Any contractor knows that the continuous operation of a bucket loader yields a higher yardage of bulk material at a less cost than any other method of loading. But, the cost of operating a Barber-Greene Bucket Loader is lowest of all. Here are a few of the long-life and time-saving features that keep expenses at rock bottom:

1. Strain and damage to boom frame are prevented because the thrust of loading is transmitted directly to the crawlers through push arms.
2. Clean pick-up, requiring no additional hand labor, is assured by the automatic follow-up scraper.
3. Wear of working parts is reduced with use of a double transmission that permits 12 crowding speeds.
4. An automatic overload release prevents breakage of operating units.
5. Points of greatest wear on the buckets are faced with an abrasion-resisting weld.

For complete details see your B-G representative or write the Barber-Greene Company, Aurora, Illinois.

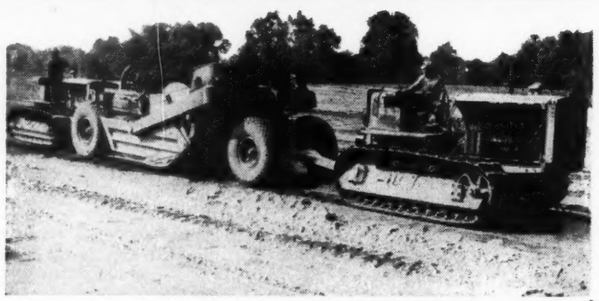
45-02

Barber-Greene B-G *Constant Flow Equipment*



*Tritt Bros. and Heffkin Bros. have consolidated their equipment for large contracts, such as the Mount Vernon, Ill. waterwork project pictured below. On this job, work done by these contractors included dirt moving, road and levee building—all completed six weeks ahead of schedule with the help of Gulf quality lubricants and fuels.

Good lubrication and efficient fuel performance contribute to maximum working hours for equipment on big water supply project



It required top performance from equipment to finish this big dirt-moving and road-building job six weeks ahead of schedule! That's why the contractors* give a sizable share of the credit for their fast progress to Gulf lubricants and fuels.

Working as a team, these quality Gulf products helped keep the contractors' equipment on the job and operating efficiently day in and day out. Added up, this kind of equipment performance means greater yardage, lower maintenance costs, and a speedier job.

Join now the list of leading contractors who have adopted Gulf quality lubricants and fuels as basic job insurance. No matter where your job is located, you're sure of quick delivery through more than 1200 warehouses located in 30 states from Maine to New Mexico. Write, wire, or phone your nearest Gulf office today.

GULF

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Gulf Refining Company
Gulf Building, Pittsburgh 30, Pa.

NEED a light, easily-held, air-saving sinker for soft or medium rock? The Cleveland H66 fills the bill perfectly. Strong rotation by this 32 lb. model carries even 12-foot drills down full length in any ground. And compressors pop off more often with Cleveland H66's on the hose lines.

The H66 has drop forge construction, swivel air connections, and strong steel puller easily opened by hand. Fast, efficient automatic valve, renewable chuck bushing, and patented lock nuts to keep side rods tight are other important features. Standard chuck: ⅞" hex. x 3¼" collared; quarter octagon also obtainable.

Bulletin 122 describes this drill in detail as well as many larger models of Cleveland Sinkers. *Ask for it!*

"TAILOR MADE" Cleveland Catalog

Let us send a catalog built especially around your own rock drill requirements—no extra pages to thumb through and take up valuable time. Tell us the type of rock drill or other pneumatic machines you are interested in—we'll send a catalog to supply the information you want.

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DIVISION OF THE CLEVELAND PNEUMATIC TOOL COMPANY

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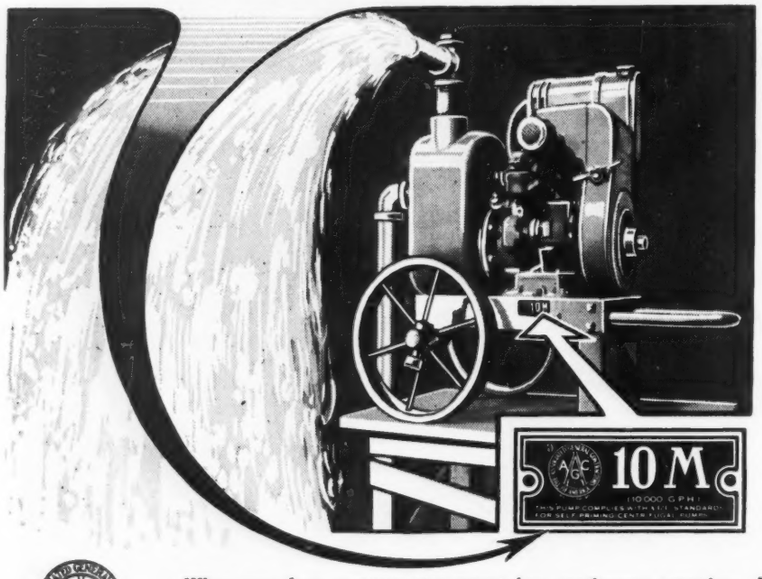

When you buy a pump you want fast continuous pumping. Be sure the pump you buy carries the AGC rating plate. The plate is your insurance that the pump will deliver its full rated capacity.

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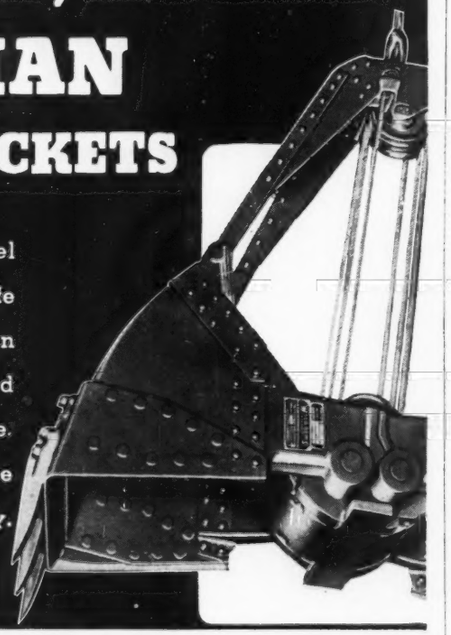
Welded Rolled Steel construction builds longer life and greater utility into Wellman buckets. Multiple Rope and Power Arm types. Dragline. Power Wheel. Special Service Buckets. 3/8 to 16½ yd. capacity.



Send for Bulletin

THE WELLMAN ENGINEERING CO.
7017 Central Avenue • Cleveland 4, Ohio
Sales and Service Agencies in Principal Cities

ARMY (E) NAVY

(Continued from page 126)

roller, loaded with water, was about 180 psi. This machine was used for rolling gutters, driveways and tight places. The 10-ton unit was equipped with an hydraulically controlled intermediate roll, which was applied to the material in each course for the final rolling.

Asphalt Mixes

Accompanying tables indicate the composition of binder and top mixes. In accordance with the Colprovia process, the asphalt cement comprised a flux oil and a pulverized hard asphalt. In mixing the paving material, the aggregate in the pugmill mixer first was coated with the oily component at a temperature not exceed-

COMPOSITION OF MIXTURES
New York State Specifications
Colprovia Cold Process Asphaltic Concrete

SCREEN OR SIEVE		PERCENT BY WEIGHT
Passing	Retained on	
	BINDER	
1¼-in.		100
1-in.	½-in.	35-70
½-in.	¼-in.	30-60
¼-in.	No. 10	6-15
Asphalt Cement		4-6
	TOP	
1-in.	½-in.	0-12
½-in.	¼-in.	15-38
¼-in.	No. 10	12-30
No. 10	No. 40	5-27
No. 40	No. 80	5-28
No. 80	No. 200	5-18
No. 200		5-12
Asphalt Cement		7-9

Asphaltic Concrete, Mixing Method, Type 3

SCREEN OR SIEVE		PERCENT BY WEIGHT
Passing	Retained on	
	BINDER	
	1-in.	0-5
1-in.	½-in.	45-60
½-in.	¼-in.	20-40
¼-in.	⅛-in.	0-15
⅛-in.	No. 80	4-10
No. 80		0-10
Hydrated Lime		0.5-1.0
Liquefier		0.4-1.0
Asphalt Cement		3.5-5.0
	TOP	
	½-in.	0-5
½-in.	¼-in.	22-38
¼-in.	⅛-in.	30-45
⅛-in.	No. 20	6-22
No. 20	No. 80	3-10
No. 80	No. 200	2-8
No. 200		2-6
Hydrated Lime		0.5-1.0
Liquefier		0.4-1.0
Asphalt Cement		6.0-7.0

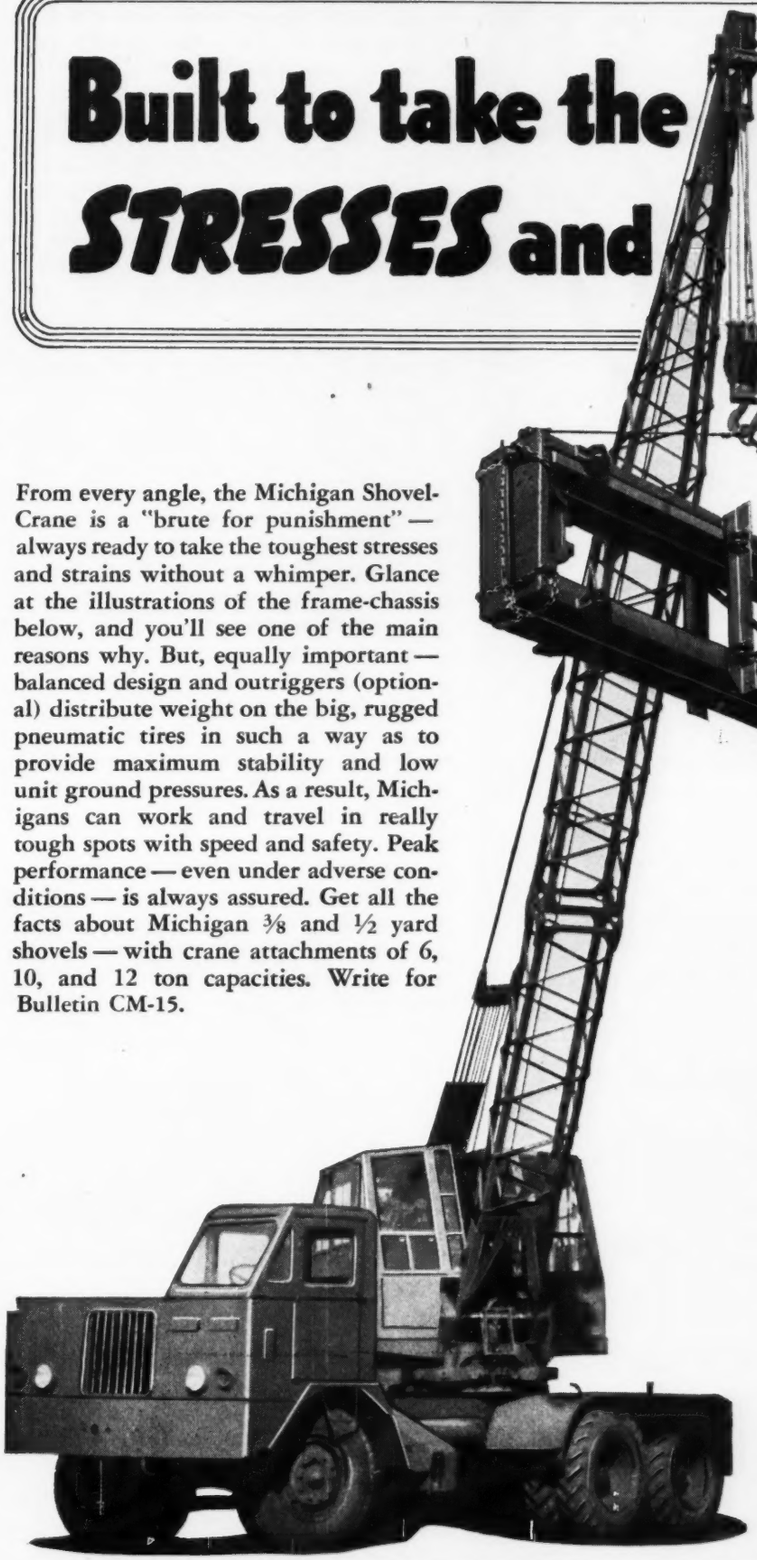
ing 150 deg. F., and the hard powdered asphalt then was added. Under rolling and the action of traffic, after being laid in the pavement, the hard asphalt amalgamates with the oil and produces an asphalt cement similar to that used in the hot asphalt paving process. Bitumen in the binder averaged 4.6 percent, and in the top, 7 percent.

All materials were weighed at the mix-

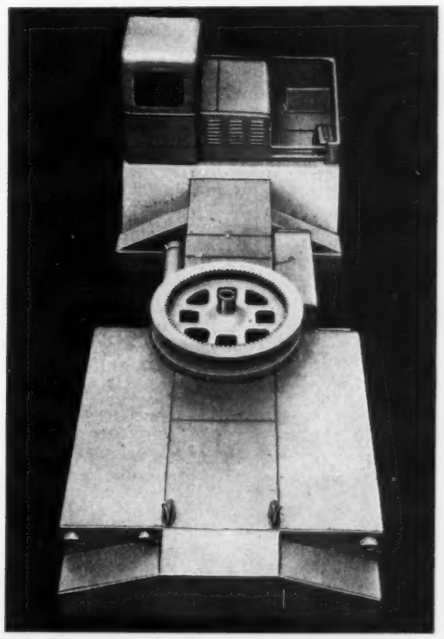
(Continued on page 132)

Built to take the TOUGHEST STRESSES and STRAINS

From every angle, the Michigan Shovel-Crane is a "brute for punishment" — always ready to take the toughest stresses and strains without a whimper. Glance at the illustrations of the frame-chassis below, and you'll see one of the main reasons why. But, equally important — balanced design and outriggers (optional) distribute weight on the big, rugged pneumatic tires in such a way as to provide maximum stability and low unit ground pressures. As a result, Michigans can work and travel in really tough spots with speed and safety. Peak performance — even under adverse conditions — is always assured. Get all the facts about Michigan ⅜ and ½ yard shovels — with crane attachments of 6, 10, and 12 ton capacities. Write for Bulletin CM-15.



Rugged chassis and frame of box type members, fabricated of high-tensile alloy steel, riveted and welded to provide maximum strength and minimum weight. Easily withstands stresses and strains.



MICHIGAN
POWER SHOVEL COMPANY
BENTON HARBOR, MICHIGAN

(Continued from page 130)

ing plant before being discharged into a twin pugmill of 1½-ton capacity, reduced to this rating from 2-ton size by the addition of paddles for more thorough mixing. The mixer could turn out a 1½-ton Colprovia batch in 1½ min., making possible a capacity of 60 tons an hour; but actual plant output was determined by the amount of water in the stone aggregate and the ability of the dryer to remove this moisture. The limestone came from a Callanan quarry in the vicinity of the plant. Filler running as much as 12 percent passing the 200-mesh was made by an impact mill at the mixing plant. Stone from a bin holding ¼- to ⅛-in. gradation was fed to the impact mill as desired. This bin was one of four overhead stone compartments; the other three held 1- to ½-in., ½- to ¼-in., and fines passing ⅛-in.

Direction

Widening and resurfacing of Route 396 in South Bethlehem were carried out under the direction of George J. Doyle, superintendent of maintenance and operation, District 1, New York State Department of Public Works, with James E. Kelly as project engineer on the job and

(Continued on page 134)

You need a "good right hand" to do the big, tough jobs! America's Post-War Construction will be that kind. The job will be BIG . . . the competition will be TOUGH!

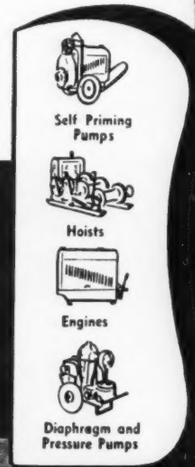
Novo Equipment can serve as your "good right hand!" Novo Engines, Pumps, Hoists, and Generator-Sets are job-designed . . . factory-tested . . . and field-proven. They are built to do the job . . . do it efficiently and economically. Every piece of Novo Equipment is backed by more than 40 years of successful manufacturing!

Novo Equipment will fit your post-war construction plans like a glove . . . a WORK-GLOVE. It's designed, built, and priced for your "right hand".

There's a Novo Distributor in your vicinity. Contact him on your Equipment needs.

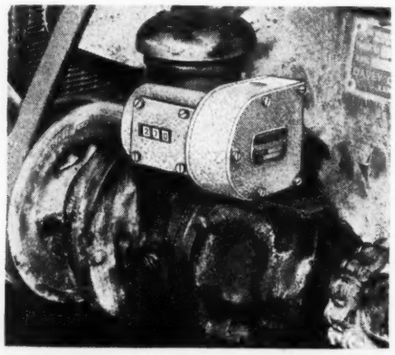
Send for Consolidated Catalogue #4-43 for full information about Novo's COMPLETE LINE of Construction Equipment.

Associate Member of A.E.D.



NOVO ENGINE CO.

LANSING 5, MICHIGAN



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Specially applicable to gas or Diesel engines, these Hour Meters register the hours of operation, just as a speedometer registers mileage. They provide valuable readings that enable owners and operators to maintain motorized construction equipment at highest efficiency. Use them on compressors, mixers, graders, tractors, bulldozers.

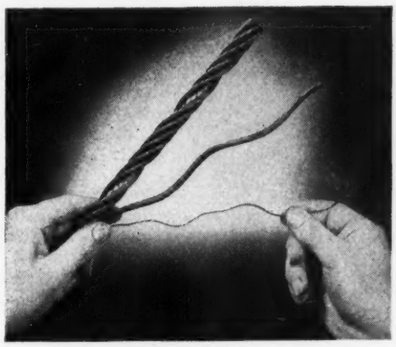
Compact, easily adaptable . . . send for complete details in

Catalog No. 20

DURANT MFG. COMPANY

1980 N. Buffum St. Milwaukee 1, Wis.

"Here are 6 reasons why I like Macwhyte PREformed Wire Rope!"



HERE'S HOW Macwhyte PREformed Wire Rope is made. Notice that the wires have a spiral shape. They have been PREformed. When the rope is made, both wires and strands fit naturally into position with a minimum of internal stress and friction.

Keep asking for
MACWHYTE PREformed!

The demands of our armed services are so great now, there may be times when we cannot give you our usual prompt service and delivery. The situation changes from day to day, so please keep trying. We'll serve you if we possibly can.

MACWHYTE PREformed WIRE ROPE
Plus
Internal Lubrication
Selected Steels
Tested-Proved

The correct rope for your equipment

"For maximum wire rope satisfaction and service, give me Macwhyte PREformed every time."
"Here's why!"

- ***"FIRST, Macwhyte PREformed lasts longer.***

  I've found that it outwears non-PREformed ropes by a big margin. That's because internal friction and fatigue are virtually eliminated. In Macwhyte PREformed, each wire and strand are shaped to lie *naturally* in the rope."

- ***"SECOND, it's more economical.***

  Because of the extra-long service Macwhyte PREformed gives, I get lower cost per load carried. My records show it actually saves me money!"

- ***"THIRD, it means fewer shut-downs.***

  That's mighty important to me, because I need every man-hour possible to maintain production schedules."

- ***"FOURTH, it's easy to install.***

  Macwhyte PREformed does not kink during unreeling. It is extremely flexible and can be put on equipment *fast*, thus saving precious time."

- ***"FIFTH, it is safer to handle.***

  Macwhyte PREformed can be cut without seizing. Broken wires stay in place, do not wicker out to injure workmen's hands."

- ***"SIXTH, Macwhyte PREformed has Internal Lubrication:***

  Heavy lubricant improves the sliding action of wires as they move in bending around sheaves and drums. In many cases the inside wires are in good condition after the outside wires are seriously worn."

MACWHYTE COMPANY

ARMY E NAVY

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NO. 780

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MACWHYTE PREformed and Internally Lubricated Wire Rope · MONARCH WHYTE STRAND Wire Rope · MACWHYTE Special Traction Elevator Rope · MACWHYTE Braided Wire Rope Slings · MACWHYTE Aircraft Cables and Tie-Rods · MACWHYTE Stainless Steel Wire Rope · MACWHYTE Monel Metal Wire Rope

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ARMSTRONG BROS.
BETTER PIPE TOOLS

Threads of Lathe-cut Smoothness

Machined from special oil-tempered Chrome-Vanadium Tool Steel, with hob-cut teeth "backed-off" from their ground cutting points; with accurately figured cutting angles and chaser rakes and ample chip clearance, these finer dies produce threads of lathe cut smoothness. They cut freely, faster, without drag and spin off the pipe without tearing or jamming.

Hardened, drawn, tempered and tested, they hold their keenness and free-cutting qualities.

They fit all standard made Stocks or Threaders—"Adjustable," "Receding" or "Solid"—come in all pipe sizes from 1/4" to 2".

ARMSTRONG BROS. Stock and Receding Threaders are improved in design, accurately balanced and machined inside and out.

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"The Tool Holder People"
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Eastern Sales Office: 199 Lafayette St., N. Y.

(Continued from page 132)

Frederick L. Miller as inspector at the mixing plant. P. J. Lamb is district engineer.

For the State Department of Public Works, Charles H. Sells heads the organization as superintendent of public works, with V. L. Ostrander as superintendent of operation and maintenance and Joseph E. Myers as senior laboratory engineer.

★ ★ ★

Post-War Roundup

(Continued from page 67)

highway department expects to have $24,500,000 of post-war highway projects which could be advertised within a 90-day period. Authorized federal-aid apportionment can be matched by legislative action appropriating money from the general fund, increasing motor fuel tax and motor vehicle license fees or by other means.

Kansas: Plans are complete or nearing completion for approximately $20,000,000 of projects, but rights-of-way could not be secured for more than shown above (in table—Ed.) within 90 days.—*R. C. Keeling, state highway engineer.*

Kentucky: Kentucky's post-war program has been designed for flexibility as to location, type and cost. This was a necessary condition of planning, since it must fit into an indefinite national scheme. (Now that federal highway legislation has been enacted, the national scheme will take more definite form, to the great advantage of Kentucky and all other states.—Ed.)

Louisiana: A bond issue of $8,300,000 was authorized, to be used to match $6,640,000 of available federal-aid allotments, leaving a balance of $1,660,000 which may be applied toward matching federal post-war funds. With the exception of this balance, it will be necessary for the state legislature to provide funds to match the federal post-war apportionment.

Michigan: The state highway department has a post-war program of projects reaching into all 83 counties of the state, to cost some $130,000,000 and provide some 1,600 mi. of new roads, some 200

(Continued on page 136)

JOHNSON'S
BULK CEMENT PLANTS
To Meet Every Need of the
PAVING
CONTRACTOR

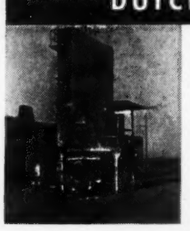
CEMENT BATCHERS

Manual automatic and semi-automatic weighing types. All-welded hoppers designed to assure free flow of materials and prevent arching of cement. Discharge valve provides positive, leak-proof operation. Overhead adapter scale frame protects operating part of the scale from dirt and accident . . . contributes to convenient operation.

ELEVATING CHARGER

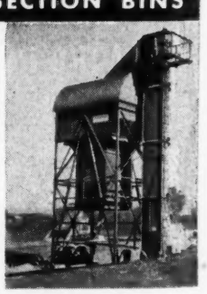
Combines advantages of adaptability, portability and Can be towed behind a batch truck. Crew of two or three men can block it into position and have it weighing 34 E paver batches at the rate of 90 per hour in 1½ hours . . . without a crane. Quickly converted to a transfer plant or for charging truck mixers.

DUTCH MILL



Designed for economical handling of bulk cement on paving jobs. All cement handled mechanically by one man. Equipped to unload cement from either hopper or box cars. Erection and dismantling are quick and easy. 50, 100 and 150 barrels capacity.

PORTABLE SECTION BINS



For contractors who need greater storage capacity than is provided by Elevating Charger or Dutch Mill. Completely portable. Capacity may be increased in the field. Equipped for unloading and batching cement delivered in any type of transportation facilities. 240 bbl., 375 bbl. and 500 bbl. capacities. Elevator Equipment with capacities up to 300 bbls. per hour.

The C. S. Johnson Company
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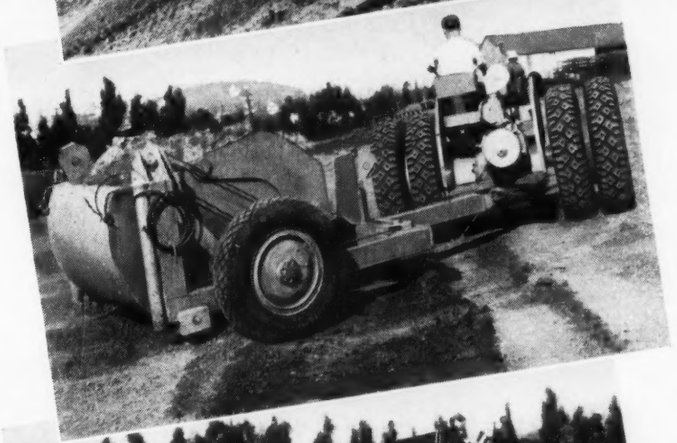
SOUTHWEST Hauling Scoop



. . . With Standard Rubber Tired Tractor . . . Ideal Combination For Maintenance And Repair

Our Highways and rural roads, overtaxed by wartime traffic, are badly in need of repair. Maintenance equipment is being utilized to the fullest extent—but requirements are continually increasing.

Modern Earth Moving methods call for speedy, economical equipment—units with all-round efficiency on every job.

Southwest proudly presents this latest development in the use of its **Single Cable Controlled Rear Dump Hauling Scoop.** Equally desirable for both on and off-highway operation where the **material** (not confined merely to earth moving) must be loaded, transported, and dumped in a heap or spread evenly. Elimination of extra equipment—reduction in manpower requirements—and lower investment are just a few reasons why it will pay you to put this combination in your equipment set-up. Write for full details.

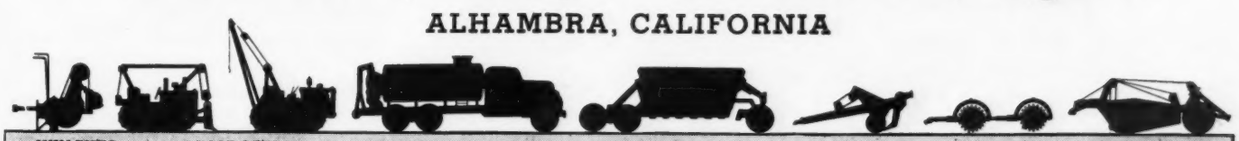
Four page bulletin available on request. Gives engineering data on the three standard sizes of Southwest Hauling Scoops. Write Department A293, Southwest Welding & Manufacturing Company, Alhambra, California.

. . . Easy Loading . . . Fast Hauling . . . Controlled Spreading . . .

CONSTRUCTION MACHINERY DIVISION

Southwest Welding & Manufacturing Co.

ALHAMBRA, CALIFORNIA



for HIGHWAYS & AIRPORTS

The modern JACKSON Vibratory Paving Tube is the only full-width internal vibrator for highway and airport paving, backed by many years satisfactory use under widely varying conditions. Proved performance certifies to the contractor and engineer that they will get desired results in efficient and economical operation, placement, density, strength and wearing surface of the finished slab. This holds true for the usual mixes designed for vibratory placement and those made with air entraining cements.

The JACKSON Tube is super-powerful, with plenty of reserve beyond the toughest jobs encountered . . . is easily attached to any modern conventional finishing machine . . . available in 10 to 25 foot widths . . . simple, dependable with all "bugs" out.

Get up-to-date on vibratory placement of pavement concrete. Write today for new JACKSON folder.

JACKSON VIBRATORY PAVING TUBE

Standard, full-width, dual vibratory tubes submerged horizontally in concrete have proved most efficient through years of exhaustive tests and extensive use. Powerful high-frequency vibratory impulses are transmitted in force through the thickest slab, quickly transforming the stiffest mixes into uniformly workable condition. If desired, other types of vibratory elements can be easily substituted with the same basic frame and carriage.

The reserve capacity of the power plant can be used to run hand operated vibrators in conjunction with the tube. The power plant also generates power for electric tools and lights used on night clean-up or emergency operations.

THERE IS A RIGHT JACKSON CONCRETE VIBRATOR FOR EVERY JOB

MANUFACTURED FOR

JACKSON VIBRATORS, Inc.

by ELECTRIC TAMPER & EQUIPMENT CO., Ludington, Michigan

(Continued from page 134)

new bridges and grade separations, several hundred miles of widening and a complete new sign system on the present 9,500 mi. of state trunklines as well as on the new post-war mileage. The program is laid out to put the major portion of the projects near urban areas where the need for roads will be greatest and where unemployment may be most severe during the transition from war to peacetime production. Michigan contractors are equipped with men and machines to handle construction work up to $75,000,000 a year.

Minnesota: In connection with the question regarding advertising of projects for bids, it is important to consider the fact that we have no assurance that there will be an abundance of equipment, materials and manpower to provide a program corresponding to this amount in all the states, and it would not seem desirable to place such a program under contract unless conditions are such that reasonable bids may be obtained.—O. L. *Kipp, chief engineer, Minnesota Department of Highways.*

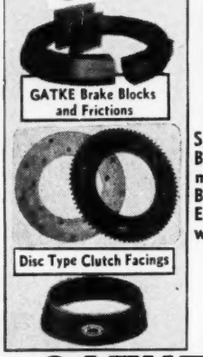
Nevada: Under the new federal high-

(Continued on page 138)

GREATER POWER EASIER HANDLING LONGER LIFE

GET THINGS DONE with GATKE

High-Heat-Resisting Asbestos BRAKE MATERIALS



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Chicago 1, Illinois

How Virginia met the need for a heavy-duty pavement

Constructing a Texaco Asphaltic Concrete pavement on Virginia Route 168, using a mechanical spreader.

Placing the final layer of Texaco Asphaltic Concrete on the left; completed pavement on the right.

Virginia Highway Engineers decided last summer that five miles of Route 168 needed a heavy-duty pavement. They elected to use Asphaltic Concrete construction for the project, specifying this type not only for the wearing surface, but also for the foundation.

An interesting feature of the new 6-inch Texaco Asphaltic Concrete pavement on Route 168 is that it was constructed in four courses—two layers of coarse-aggregate asphaltic concrete for the 3½ inch foundation and two layers of fine-aggregate asphaltic concrete for the 2½ inch wearing surface.

Much of the traffic to and from the busy Hampton Roads section of Virginia will use this new pavement on Route 168. That the resilient, durable qualities of Texaco Asphaltic Concrete are fully equal to the hardest kind of usage has been demonstrated over a period of 40 years on many of America's most heavily travelled roads and streets.

Texaco Engineers, who are asphalt specialists, are at the service of anyone having a paving problem. Write our nearest office if you desire the cooperation of one of these engineers.

Roller puts the finishing touches to the new 6-inch Texaco pavement.

No time is lost in throwing the completed Texaco Asphaltic Concrete pavement open to traffic.

THE TEXAS COMPANY, Asphalt Sales Dept., 135 E. 42nd St., New York City 17

Boston 16 Chicago 4 Denver 1 Houston 1 Jacksonville 2 Philadelphia 2 Richmond 19

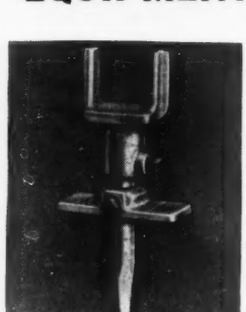
TEXACO REG. T. M.

TEXACO ASPHALT

Whiteman CONCRETE EQUIPMENT

Has proved its value in saving labor and speeding construction on many war projects. The WHITEMAN Rodding Machine, the combination Floating-Finishing Machine, the Hand Grill Tamper and the Screed Stake Cap (illustrated at right) are available on properly rated orders.

For information see your nearest distributor or write direct.



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Refined TO PROVIDE Greater Compactness, increased Capacity and Efficiency

H & B Portable (PA-30) Asphalt Plant

☆ This popular portable asphalt plant has been made even more compact and efficient by several refinements in design. A larger fan and a new horizontal cyclone dust collector are used, and the duct system from the dryer to the dust collector and from the dust collector to the exhaustor has been redesigned. The exhaust fan, motor which drives the dryer, and the speed reducer are combined in one completely assembled unit which is mounted on a separate platform. This decreases the length of the dryer unit, and greatly facilitates handling. A new type of screen reduces the overall height of the plant—without reducing the bin capacity.

Complete information on this more efficient portable plant will be furnished on request.

HETHERINGTON & BERNER Inc.
735 Kentucky Avenue • Indianapolis 7, Indiana

H&B Hetherington & Berner

(Continued from page 136)

way act, Nevada will receive more federal funds for highway work than it has ever had before. The additional funds will be badly needed, as during the last three years the department has been unable to reconstruct any of its road system. Heretofore it has been the policy to reconstruct between 125 and 150 miles each year; thus all of the most badly deteriorated sections were kept caught up. We estimate that right now there is better than $10,000,000 worth of work needed, and total road improvements over the next five or six years approximate $38,000,000.—*H. D. Mills, assistant state highway engineer.*

New Jersey: In addition to the above figures (shown in table—Ed.) various counties and municipalities in New Jersey will have highway work ready to advertise in connection with our state aid program in the amount of $2,000,000, the necessary funds for which are presently available. As a matter of fact, some $5,000,000 of state funds in addition to funds shown in the questionnaire are now available to provide state aid to political subdivisions of the state for highway work.—*Spencer Miller, Jr., state highway commissioner.*

North Carolina: As of July 1, 1944, the state had $39,891,719 in surplus highway funds, including all unexpended federal appropriations which had been allocated to the state up to that time. The 1943 legislature provided for issuing approximately $15,000,000 in bonds that might be used to supplement federal funds. However, it is not anticipated at this time that we will need to issue any bonds for the post-war program, as we expect to have sufficient surplus highway funds at the end of the war to match any reasonable federal highway apportionment. The demand will be extremely heavy for highway improvements in this state, and it is our plan to let work to contract as fast as the organization can be built up to take care of it and the contracting industry can absorb it.

We estimate it will require approximately $175,000,000 to bring our present highway system in this state up to present-day standards. In addition, we have many miles of old pavement which are well worn and fatigued. We are having extreme difficulty in obtaining designers and draftsmen to build up a backlog of plans for the post-war program, and it is our anticipation that there will be considerable difficulty in securing necessary construction engineers to handle the program when the war is over. If this situation does exist, it will mean that we will not be able to move as rapidly as we would like to in the

(Continued on page 140)

Alcan Veterans Show

HOW AIRPORT CONSTRUCTION CAN BE SPEEDED WITH TOURNAPULLS

Tournapull stripping 3 inches of top soil gets hauling loads like this in 50 seconds. No waiting at shovel. Tournapulls used here travelled under their own power 750 miles from Dawson Creek to Watson Lake, were later brought by rail to Peoria and reconditioned. They travelled the 150 miles from Peoria to Dubuque in about 15 hours.

Average 10 Loads per Hour on Half Mile Round Trip Haul...Travel to Job Over Highway Under Own Power

To build a 4,500,000-yard airport at Dubuque, Iowa, in 160 days, McVaugh-Haynes Co. travelled 10 Tournapulls, reconditioned veterans of the Alcan Highway, to the job. The hilly site, selected to put the airport above reach of Mississippi flood waters, requires fills up to 50 feet deep and cuts of 35 feet. An early time study, made while the Tournapulls were stripping top soil and stockpiling it, shows these results:

Material ..... **sod and black dirt**
Loading time ..... **50 sec. (average)**
Loading depth ..... **3 inches (stripping)**
Loading distance .... **150 to 200 feet**
Haul distance ..... **½ mile round trip**
Cycle time ..... **6 min. (average)**
Trips per hour **10**
Estimated load per trip ..... **12 cu. yds.**
Hourly yardage ..... **120 cu. yds.**

Like McVaugh-Haynes Co., and many other successful contractors, you will find Tournapull earthmoving faster and cheaper. Try it!

LESS FIRST COST — MORE POWER

To begin with, Tournapulls cost you $500 to $7000 less than crawler-scraper rigs of comparable hourly capacity. What's more, your Super C Tournapull lugs but 207 pounds per horsepower, while each horsepower in a crawler-scraper unit of the same 15-yard capacity has to budge 411 pounds.

You get the same one-man loading, hauling and spreading efficiency. But Tournapull speed is 2 to 3 times faster than the fastest crawling tractor, thus making profitable any haul from 300' to 3 miles. And Tournapull design concentrates weight and power on two big rubber-tired drive wheels to give you greater traction, maximum flotation and quick turning.

SEE YOUR LeTOURNEAU DEALER

Why use slow-moving crawler equipment or one-purpose loading and hauling rigs, when you can move more yardage farther, faster and more profitably with Tournapulls. See your LeTourneau Distributor . . . he can help you get new Tournapulls NOW for essential jobs or reconditioned Tournapulls for low-priority work.

Tournapull stockpiling top soil for future use on Dubuque airport. In addition to 10 Tournapulls, McVaugh-Haynes uses 8 tractor-drawn LeTourneau Carryalls for short-haul earthmoving, 4 LeTourneau Dozers and a Rooter on this job.

JOB PROVED

2600 Now in Use by Alert Earthmovers

LETOURNEAU

PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

TOURNAPULLS

Manufacturers of TOURNAPULLS*, A
GLEDOZERS*, BULLDOZERS, TIL
DOZERS*, CARRYALL* SCRAPE
POWER CONTROL UNITS, ROOTER
TOURNATRAILERS*, TOURN
CRANES*, TOURNATRUCKS*, SHEE
FOOT ROLLERS, TOURNAROP
TOURNAWELD*, TOURNALIFTS*,
*Trade Mark Reg. U. S. Pat. C

RUBBER-TIRED POWER FOR FASTER EARTHMOVIN

(Continued from page 138)

needed post-war construction program.—*W. Vance Baise, state highway engineer.*

North Dakota: A debenture issue of up to $12,360,000 was approved by popular vote at the November 7, 1944, election, for use in matching federal highway funds.—*J. S. Lamb, state highway commissioner.*

Pennsylvania: As of October 30, 1944, the state highway funds amounted to $52,000,000, of which $23,500,000 was for construction, reconstruction and resurfacing under way. There will be approximately $42,500,000 balance in the motor license fund on January 1, 1945, which will be available for construction. If the war ends by December 31, 1944, there should be $20,000,000 available out of next year's receipts for construction.

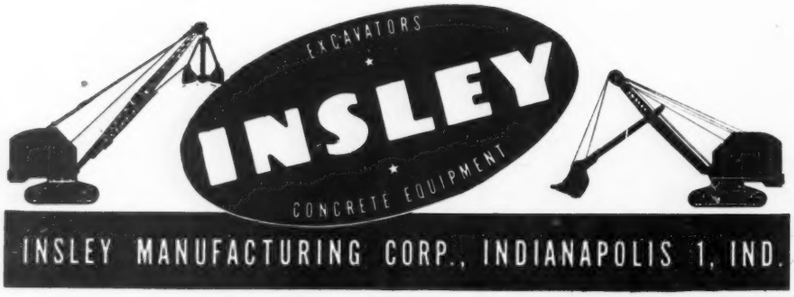
Wisconsin: Volume of work submitted to contract will be subject to availability of additional personnel necessary to supervise the work and to the extent to which construction industry is able to absorb the relatively large number of small projects involved.—*E. L. Roettiger, state highway engineer.*

Interchangeable Attachments

Insley Type K Excavators—both the ⅜ and ½-yd. models—are designed to handle six readily interchangeable attachments . . . shovel . . . trench hoe . . . basement hoe . . . crane . . . clamshell . . . dragline.

With any one of these attachments, the basic features of Insley Excavator design assure you of maximum mobility . . . easy maneuverability . . . low-cost yardage in the tightest spots or the toughest terrain.

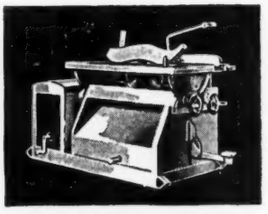
Inquire now about an Insley Excavator for your postwar dirt or rock moving and material handling jobs. Be ready to specify INSLEY when conditions again permit production for peacetime needs.



INSLEY MANUFACTURING CORP., INDIANAPOLIS 1, IND.

C.H.&E.

SAW RIG



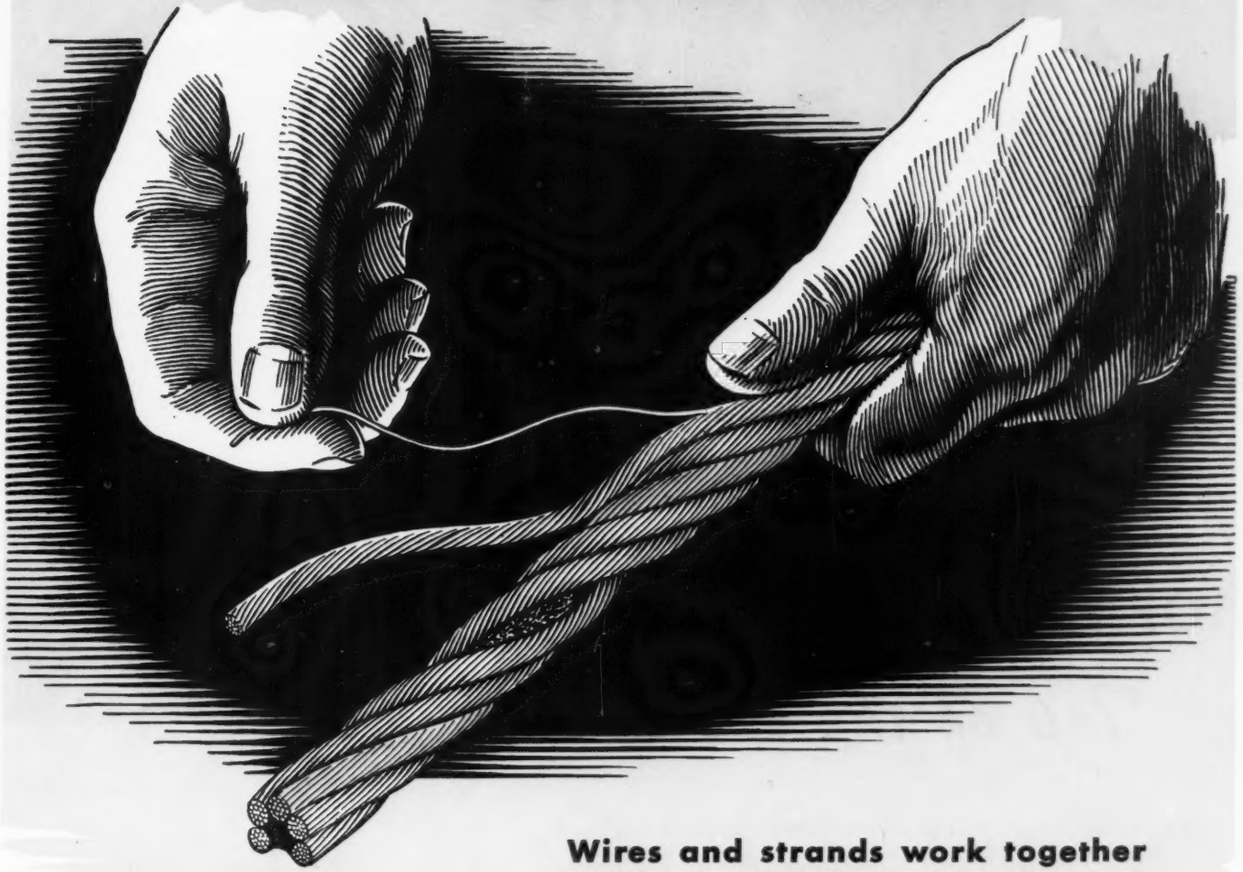
No. 33 Saw Rig

We also manufacture Pumps—Hoists—3 Ton Rollers—Bar Cutters and Benders.

Write for catalog.

C. H. & E. Manufacturing Co.
3847 No. Palmer St.
Milwaukee 12, Wis.

This fight is over



Wires and strands work together instead of against each other in *PREFORMED* YELLOW STRAND . . .

Don't get us wrong. The fight you *want* in *Preformed* Yellow Strand is there. It fights wear . . . delay . . . excessive wire rope costs.

But no one wants fight *inside* a rope—the wasteful stresses that result when springy wires and strands are twisted into place and kept there by force. Such straining parts are bound to lower the efficiency of an unpreformed rope.

This condition is corrected in the making of *Preformed* Yellow Strand. A patented process *preforms* each strand . . . sets both the strand and its wires to the curvature needed in the finished rope. The parts don't fight . . . they *fit,* as the illustration shows.

With internal conflict under control, a rope has little reason to stiffen, kink or squirm. So *Preformed* Yellow Strand is flexible and easy to manage. It is better prepared to withstand bending fatigue. It spools evenly . . . requires less breaking-in . . . increases safety . . . lasts longer.

Specify *Preformed* Yellow Strand by name. Get all you should in wire rope performance and economy. Broderick & Bascom Rope Co., St. Louis 15, Mo. *Branches:* New York, Chicago, Houston, Portland, Seattle. *Factories:* St. Louis, Seattle, Peoria.

HAND BOOK FREE: "Industrial Wire Ropes" contains useful facts, tables, pictures. Write for your copy.

ARMY E NAVY

BRODERICK & BASCOM

Yellow Strand

PREFORMED WIRE ROPE

TOP PERFORMANCE AT THE

Top of the World

The several hundred Marmon-Herrington *All-Wheel-Drive* converted Fords, now operating on the upper reaches of the Alcan Highway and on the Canol Project, have won unstinted praise from contractors and drivers.

The unusual ability of these trucks to hold traction on hard-packed snow and ice, plus their all-around ease-of-handling and dependability, provides an excellent recommendation for *your extra-difficult service* after the war.

For road construction and maintenance, including snow removal, for operation in pits, mines and quarries, for public utility line service, etc., these trucks have no equal at the price. Write for literature.

MARMON-HERRINGTON CO., INC.
INDIANAPOLIS 7, INDIANA

MARMON-HERRINGTON
All-Wheel-Drive TRUCKS

Pavement Widening

(Continued from page 87)

width of 30 ft. plus 5-ft. sidewalks on both sides. The grading contractor was first required to construct detour approaches to the west of the pavement and the bridge contractor then moved the existing bridges intact to the detour location to carry traffic while the new structures were being built. While the detour bridges in this new position accommodate traffic free from the major part of the new bridge site, the bridge contractor constructs the easterly half of the new bridge complete to the finished deck. The deck of the new bridges is concrete, tied to the treated timber stringers by steel pin connectors in order to transfer the shearing stress. When the easterly halves of the new bridges are constructed, traffic will be turned to these new portions, their width, including sidewalk areas, being sufficient for two-lane traffic. The detour bridges will then be removed and the westerly halves of the structures completed.

Equipment and Materials

The bridge contractor, the Frank Watts Construction Co., of Portland, used the following equipment on the job: Lima crawler crane, 90-ft. boom; Schramm compressor, 110 cu. ft.; two concrete mixers, truck type, 4-cu.yd. capacity; De Walt power saw.

The grading and paving contractor, Porter W. Yett, of Portland, used the equipment listed at end of this article.

Sub-base material for this project was obtained from a developed gravel pit adjacent to the highway and about midway of the length of the contract. The concrete paving plant and the asphalt paving plant are located at the south end of the project in the town of Harrisburg, adjacent to a commercial gravel plant which is supplying the aggregates required in both portland cement concrete and asphaltic concrete.

Mr. Yett's superintendents on the project are George Cressler, in charge of the grading and rock work, and Robert Ellis, in charge of all paving work. Mr. Yett spends a considerable portion of his own time on the work.

The bridge contract totals $59,190 and the grading and paving contract approximately $376,700, a total of $435,890. Add-

(Continued on page 146)

VELVETOUCH PUTS POWDER METALLURGY TO WORK FOR INDUSTRY

A CLUTCH DISC THAT'S PROVED ITSELF

SMOOTH...
TOUGH...
DEPENDABLE!

Clutch discs are a mighty important factor in your heavy equipment. They've got to be able to take it. They can't grab or slip when the going gets rough. Extreme conditions of temperature must not affect them.

The S. K. Wellman Company long ago recognized the need for a superior clutch disc and developed Velvetouch, the original all-metal friction material. Velvetouch is engineered to perform better and wear longer than any other clutch facing. It has proven itself in the field. Velvetouch is smooth in operation because it eliminates the principal causes of chattering and grabbing. Oil and water have little effect on it, and slipping is reduced to a minimum. Fewer adjustments and replacements mean less "down time."

Specify Velvetouch for replacements in *your* tractors, scrapers, shovels and other earth-moving equipment.

THE S. K. WELLMAN COMPANY
1374 EAST 51st STREET • CLEVELAND 3, OHIO

For Brake and Clutch... use **Velvetouch**

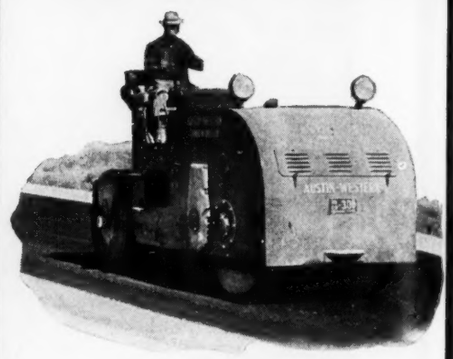
BUILT to

Exclusive features that save time and money by getting the job done better and quicker. "Plus values" built into every Austin-Western machine... values accumulated by engineering experience that has lived close to road building and earth moving problems and practices since the first crude Austin-Western tools of 1859.

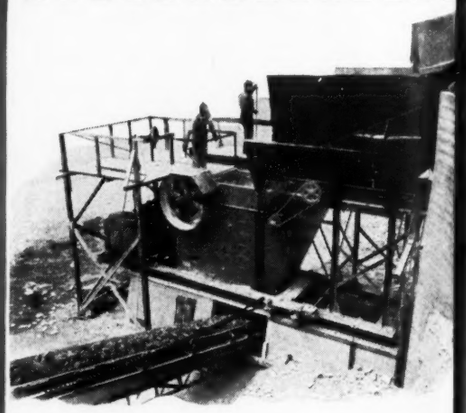
Features of design and construction "job tested" before the war... that have met the acid test of service on far-flung war fronts.

Your post-war Austin-Western machine may, or may not, resemble the model of today; but of this you can be sure... it will embody all the performance features of yesterday that have measured up to today's infinitely higher standards, PLUS everything that today is teaching us for tomorrow. More than ever it will be "Built to Outperform."

AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS, U.S.A.



TANDEM ROLLERS—Made in 2 sizes—5 to 8-Ton and 8 to 10½-Ton. The variable weight feature enables one machine to handle a wide variety of jobs.



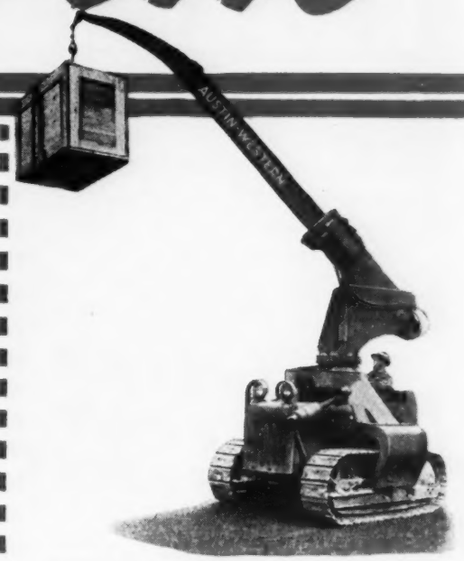
CRUSHING EQUIPMENT—Roller bearing jaw crushers and roll crushers in a wide variety of sizes. Portable and semi-portable crushing and screening plants for all purposes.

MOTOR GRADERS—The "99-M" and "88-M" Power Graders with their exclusive All-Wheel Drive and All-Wheel Steer, and wide assortment of attachments, are famous for their ability completely to outperform ordinary motor graders. The No. 55 is a smaller model for maintenance and light grading.

Outperform

3-WHEELED ROLLERS—Made in sizes ranging from 6 to 12 tons. Gasoline or diesel engines. Hydraulic power steer. Hydraulic scarifier attachment.

PATROL SWEEPER—Compact, simplified, quick-dumping. Rear broom throws dirt directly into hopper. May be had with Leaf Broom attachment.



HYDRAULIC CRANE—Retractable-extensible boom provides ability to lift and carry maximum load under such handicaps as low doors and ceilings, inside box cars, etc.

BADGER SHOVEL—Convertible to crane, dragline, piledriver, trench hoe, and skimmer. 3/4-swing design has many operating advantages.

TRAIL CARS—Hopper-bottom and side-dump types. Designed for heavy duty haulage behind powerful truck-tractors, in open pit mines, quarries, etc.

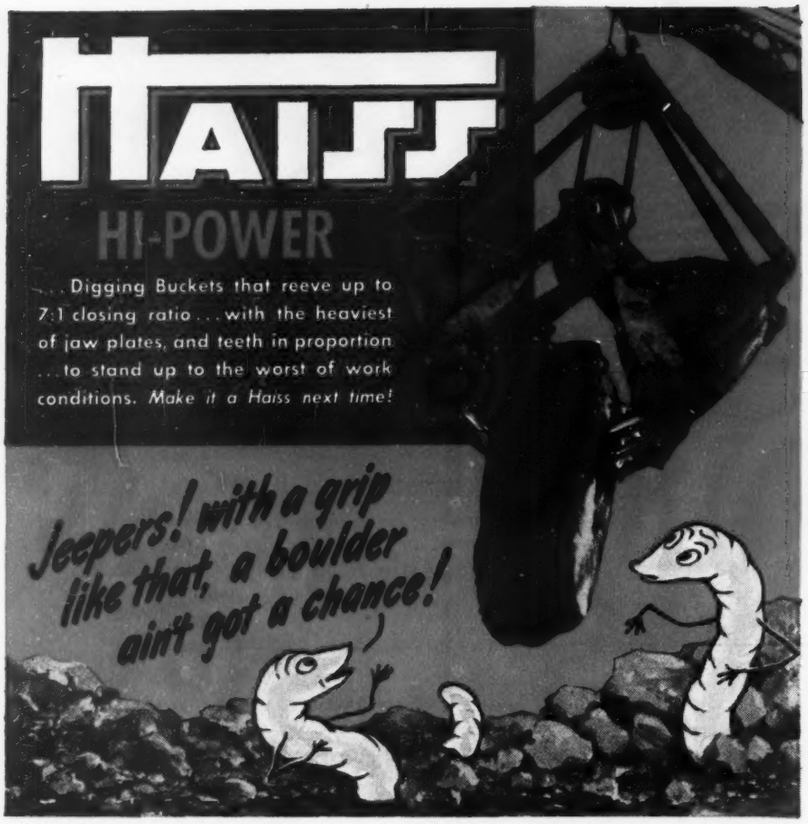
DUMP CARS—Side dump models built in capacities up to 50 yds. (level full), and 90 Tons; in standard, narrow and foreign track gauges. Also hopper type, bottom-dump Cars.

BUILDERS OF ROAD MACHINERY

Austin-Western

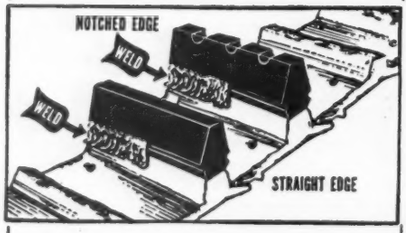
SINCE 1859

BUY MORE WAR BONDS


HAISS
HI-POWER
...Digging Buckets that reeve up to 7:1 closing ratio... with the heaviest of jaw plates, and teeth in proportion ...to stand up to the worst of work conditions. Make it a Haiss next time!
Jeepers! with a grip like that, a boulder ain't got a chance!

GEORGE HAISS MANUFACTURING CO., INC., 139th St. & Canal Place, New York 51, N.Y.
Bucket agencies throughout the country. Write, wire for prices, delivery or catalogs.

Rebuild your
TRACTOR GROUSERS
WITH BULLDOG
Grip-Lugs



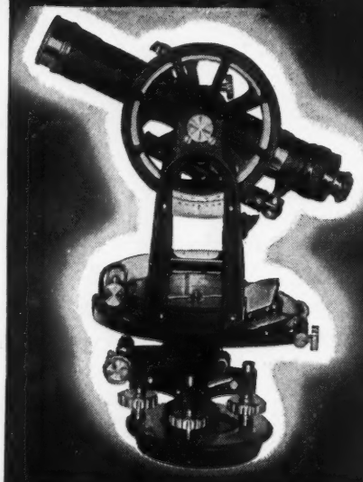
Easily Welded

OTHER PRODUCTS
TRAK-LINK RE-NU PLATES
MANGO BARS FOR REPOINTING DIGGER TEETH
EXCELLOY OVERLAY METAL

SEND FOR FOLDER CM

ALLIED STEEL PRODUCTS, INC.
NBC Bldg. Cleveland, Ohio

Serving the Services is a HIGH HONOR
WHITE TRANSITS and LEVELS
are doing an outstanding job throughout the World



TYPE II U. S. ARMY TRANSIT
• ACCURACY • PRECISION
• DEPENDABILITY
Recommended for precise Municipal, Railroad, Highway and Bridge Work.
DAVID WHITE CO.
315 W. Court St. Milwaukee 12, Wis.
• Send for Bulletin 1039

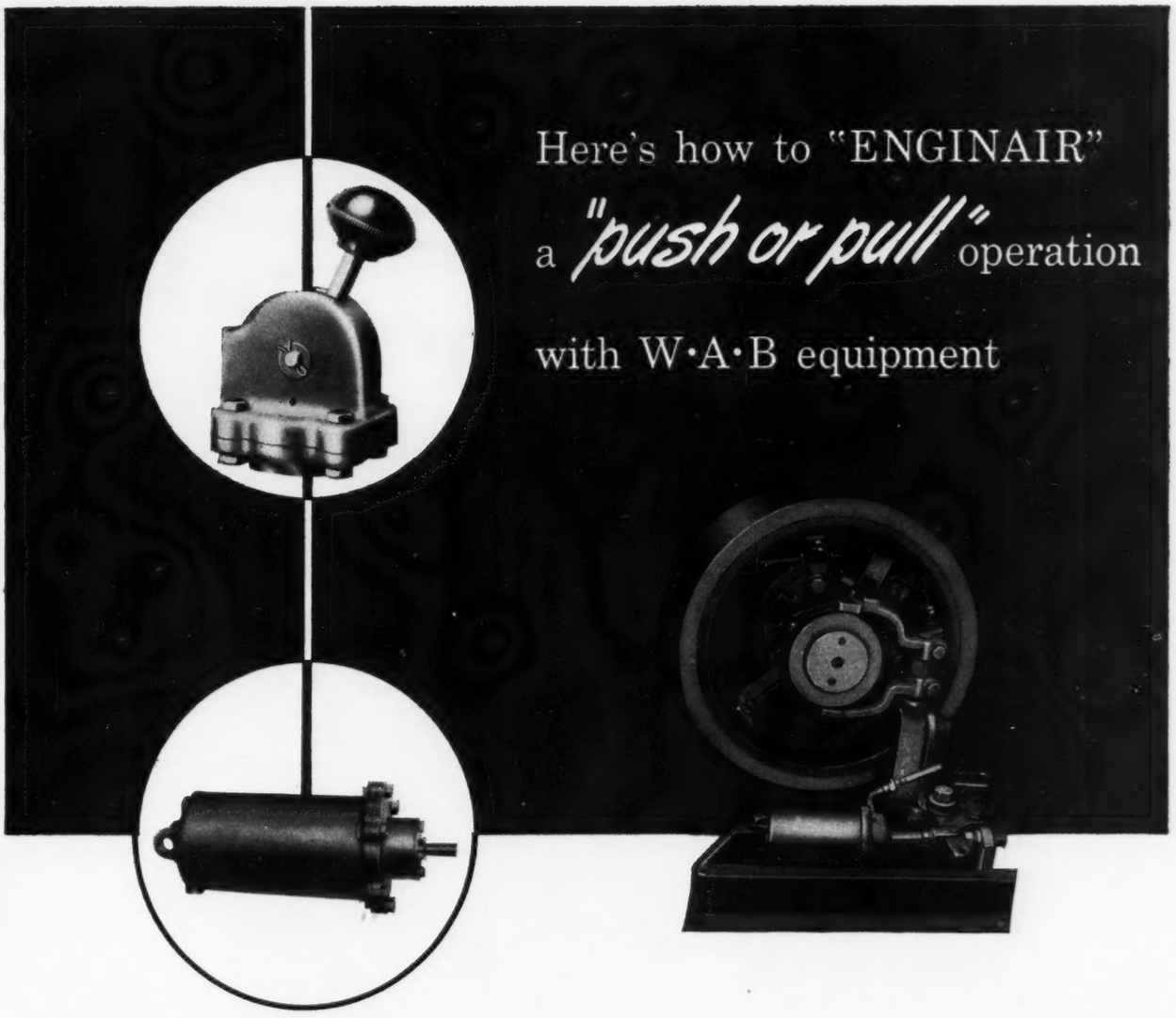
(Continued from page 142)

ing 10 per cent for engineering and contingencies brings the total cost of the project to a little less than $500,000.

The work is being handled directly by the Oregon State Highway Department, in cooperation with the U. S. Public Roads Administration, Portland District. F. D. Eason is the division engineer in charge of all construction. H. M. Teel is resident engineer in charge of bridge work and E. E. Umphlette is resident engineer in charge of grading and paving work. The bridge work is under the general supervision of G. S. Paxson, bridge engineer, and the grading and paving work under the general supervision of H. G. Smith, construction engineer.

CONTRACTORS' GRADING AND PAVING EQUIPMENT

1—Byers ¾-yd. shovel
1—Bucyrus-Erie ¾-yd. shovel
1—Bucyrus-Erie ½-yd. hoe
1—Insley ½-yd. dragline
1—Bucyrus-Erie ⅜-yd. shovel
1—75 Caterpillar tractor & 12-yd. LeTourneau carryall
1—R.D. 8 & 12-yd. LeTourneau carryall
1—Allis-Chalmers tractor & 8yd. LeTourneau carryall
1—R.D. 6 Cat. and dozer
1—R.D. 8 Cat. and dozer
1—Mogul pull grader
2—No. 12 Caterpillar motor patrols
1—No. 11 Caterpillar motor patrol
1—Pavement ripper
1—Single sheepsfoot roller
1—Double sheepsfoot roller
1—Buffalo-Springfield 10-ton 3-wheel roller
1—Huber 10-ton 3-wheel roller
1—Austin 6-ton tandem roller
1—16,000-lb. Howe scale of platform type with weightograph and batch hopper conveyor feed and two-compartment truck charging hopper-cement charger consisting of three 9-cu. ft. hoppers, equipped with air jets and canvas loading spouts
1—27-E-7-sack Rex paver
1—Ord concrete finishing machine with Mall vibrator attached
1—Johnson concrete float machine
1—Mall portable vibrator
1—1,000-lb. Madsen asphalt plant with double drum 80-ft. tunnel belt conveyor feed
1—50-hp. oil burning portable boiler mounted on trailer chassis for heating asphalt at railroad siding
4—1-carload capacity asphalt tanks with steam coils
1—1,000-gal. tank truck with heating coils for transporting asphalt from railroad siding to plant,—about ½-mi.
1—6,000-gal. fuel oil tank
1—Littleford portable asphalt pump for unloading asphalt
11—5-yd. dump trucks with three compartments and batch gates
6—4-yd. dump trucks
3—Water tank trucks
3—Water pumps—3-in. gasoline centrifugal supply pumps
1—2½-in. 5-h.p. centrifugal supply pumps
1—105-Cu. ft. Chicago pneumatic compressor
1—1 h.p. air compressor for cement plant
1—Welding machine
2—Superintendents' pick-up trucks
1— " station wagon truck
1—Ford flatbed service truck
1—Pick-up service truck
2—Grease trucks equipped with air compressor and pressure guns
1—1,000-gal. capacity oil distributor truck
1—Equipment repair shop and storage house (24x60 ft.) equipped with electric portable Skilsaw for cutting stakes and sleepers for concrete paving forms
1—Three-carload cement storage house.
2—Gas-driven power brooms
1—Littleford two-burner pavement burner
1—¼-h.p. gasoline portable Hunt process spray machine
2—Pavement breakers and tamping hammers
1—One-ton drop hammer



The whole history of industrial development has been the substitution of horse-power for muscle-power in production jobs. W·A·B devices let you apply the same sound principle to *control* jobs, too.

In the countless control applications where only a simple push or pull is involved, the two W·A·B devices pictured, plus a source of compressed air, are all you need to do the trick. Movement of the control handle—you can shift it with a finger-tip—produces immediate responsive movement of the piston in the air cylinder. Any desired actuating force, from ounces to tons, can be designed into the system. The control valve and piston may be separated by any distance, and connected by an air line. In cases where the actuating equipment is mounted on a mobile part this line can be flexible. A battery of control valves, to govern any number of functions, can be concentrated on one small stand. The complications, adjustments, and maintenance of mechanical linkages are minimized or eliminated.

The illustration at right shows a simple "push-pull" system applied to a clutch—only one of many possible applications. If you have any control problem in your present or contemplated production equipment or products, "Enginairing" (which is engineering applied to air) can probably solve it better. You'll find proven W·A·B devices available to do the simplest and the most complicated jobs. Ask for Tite-Air Valve descriptive circular No. 1DA-9431-1.

WESTINGHOUSE AIR BRAKE COMPANY
INDUSTRIAL DIVISION

General Offices:
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WABCO PACKING

COMPRESSORS

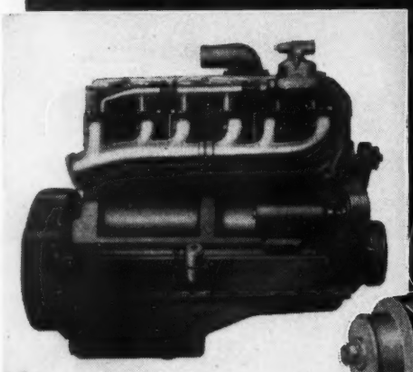
REMOTE CONTROLS

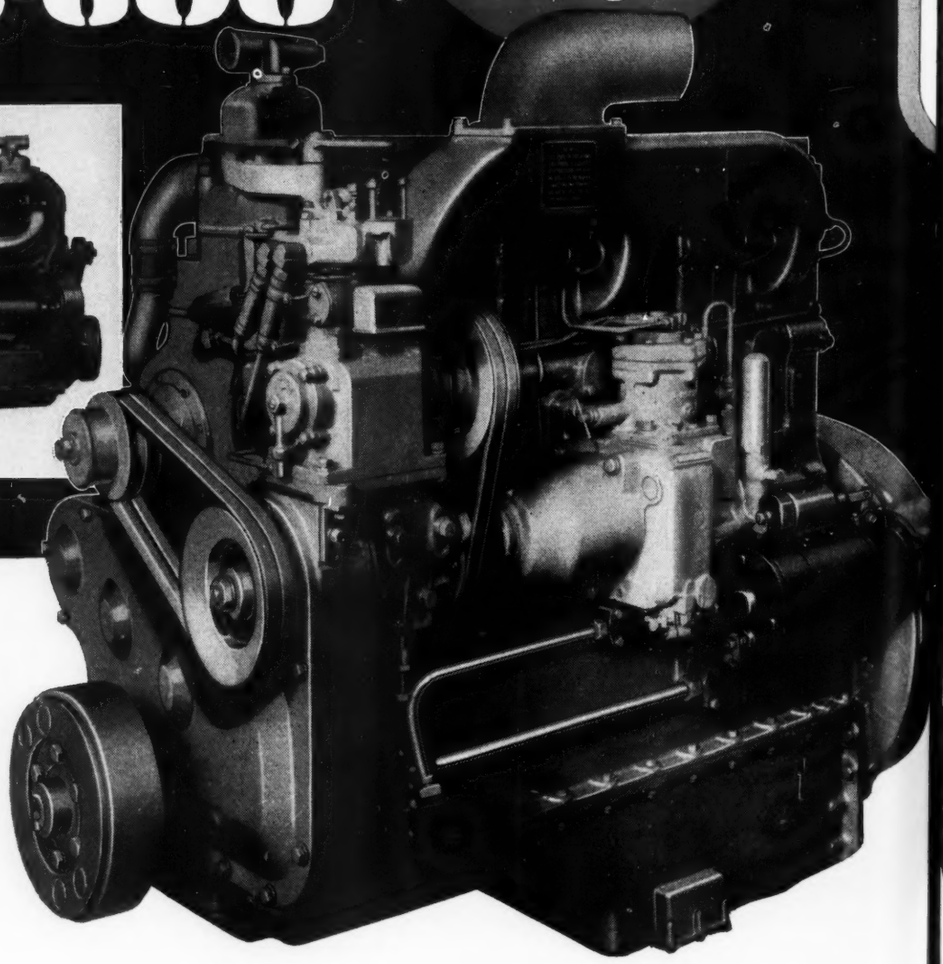
Nth Degree in Power

Models NH-600 and NHS-600

CUMMINS *Dependable* DIESELS

SINCE 1918...PIONEER OF PROFITABLE POWER THROUGH HIGH SPEED DIESELS





200 hp.

Model NH-600, 200 hp. at 2100 rpm. (maximum). Designed for heavy-duty automotive, industrial and marine service. For specifications, see table on opposite page.

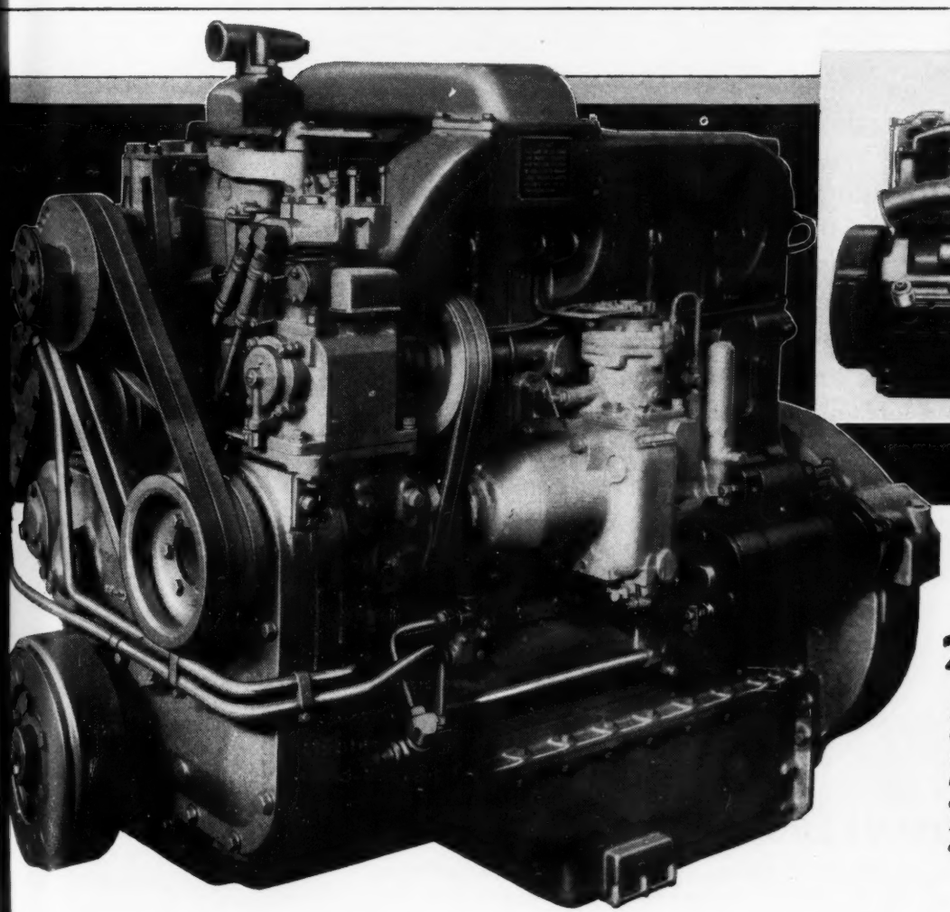
mbining "something old and something new," Cummins—builder of the *inal* high speed diesel—now introduces two additions to the line of Cummins pendable Diesels: Models NH-600 and NHS-600.

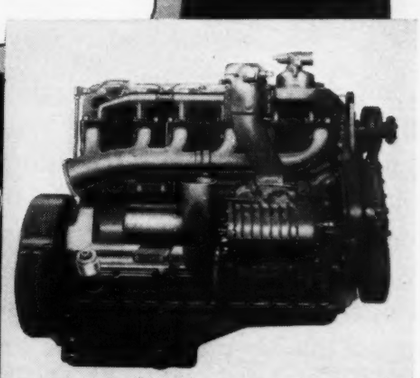
The "something old" is the basic design of the well-known Model H Cummins sel . . . a design proved sound by a 12-year demonstration of low-cost, depend- performance in all types of heavy-duty applications.

The "something new" in NH and NHS Cummins Diesels includes dual intake exhaust valves, higher rpm., larger piston displacement and many other nements that will give you "more power per pound" and the Nth degree ower efficiency . . . that will assure increased payloads and higher profits on r *tough* jobs—automotive, industrial or marine. A comprehensive brochure taining complete specifications and engineering data on Series NH and NHS mmins Dependable Diesels is now available. Write for your copy of Bulletin 6-18 today. CUMMINS ENGINE COMPANY, INC., Columbus, Indiana.

del	No. of Cyl.	Bore and Stroke	Displacement (cu. in.)	HP. (Maximum)	RPM. (Maximum)	*Weight	Weight per Horsepower	*Dimensions
	6	4 7/8" x 6"	672	150	1800	2165	14.43	57 5/32" x 46 1/2" x 30 1/4"
	6	4 7/8" x 6"	672	200	1800	2580	12.9	58 5/32" x 46 3/8" x 29 3/16"
	6	5 1/8" x 6"	743	200	2100	2500	12.5	58 9/32" x 49 3/16" x 28 7/8"
S	6	5 1/8" x 6"	743	275	2100	2850	10.36	60 1/32" x 48 13/16" x 32 3/8"

*Weights and dimensions are for engine as designed for automotive application (as illustrated) and will vary with units designed for industrial and marine service. Weights are based on minimum use of light weight materials.





275 hp.

Supercharged Model NHS-600, 275 hp. at 2100 rpm. (maximum). Designed for heavy-duty automotive, industrial and marine service. For specifications, see table above.

Comparing yesterday's transportation with today's is an eye-opener. ★ In this march of progress Raybestos has kept ahead, by producing the most complete line of brake linings and clutch facings in America; by providing friction materials that are exactly right—because specially engineered—for every make, model and job, and by winning universal acceptance based squarely upon customer satisfaction. ★ Tomorrow, out of Raybestos' war production, will come still better Raybestos products, to make it still more worthwhile for you to "specify Raybestos".

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Lubricants definitely reduce friction and wear to a minimum. They lower power costs and prolong the life of equipment to an infinitely greater degree. LUBRIPLATE arrests progressive wear.

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Lubricants protect machine parts against the destructive action of rust and corrosion. This feature alone puts LUBRIPLATE far out in front of conventional lubricants.

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NEWARK 5, N. J.
TOLEDO 3, OHIO

Runways and Aprons

(Continued from page 69)

reclaimed land soil condition. Preliminary investigation of subgrade showed the area to be a combination of hydraulic fill and city waste disposal on top of the old Duwamish tide flat. This necessitated soil auger borings on a grid on 25-ft. centers to obtain a suitable soil profile of the areas to be paved. The soil profile revealed that the areas were spotted with alternate layers of sand, organic and inorganic silts, with some areas of ashes, bricks and debris of numerous types. The water table varies from 2 to 11 ft. from the surface.

Test Sections

To obtain design data on the bearing capacity of subgrade and thickness of base course necessary to withstand wheel loads of 80,000 lb., a series of four test sections, each 15 ft. wide and 20 ft. long, was constructed in areas of the field which would represent a cross-section of subgrade to be encountered. Results showed that in areas where the subgrade was sand, a 6-in. layer of crushed rock was sufficient for a base course. In silty areas, it was necessary to remove silt to a depth of 1 to 2 ft., depending on the moisture content, and to backfill with pit run gravel.

Job Progress

Paving on the Boeing Field project is progressing at the rate of 4,500 sq. yd. per day, the entire job necessitating 350,000 sq. yd. Aprons and taxiways are paved 9 in. thick, with edges increased to 13½ in. The runway extension is 8 in. thick with edges thickened to 12 in. Concrete was poured in alternate strips 25 ft. wide. Mixes were designed to produce concrete with an average flexural strength at 28 days of 700 lb. per sq. in. and compressive strength at 28 days of 4,500 lb. per sq. in.

The aggregate batching plant is located on the Duwamish waterway, approximately 2½ mi. from construction operations. Coarse aggregate, fine aggregate and sand are delivered to the batching plant in scows loaded in proportion to mix used, with 300 to 750 cu. yd. total on each scow. Material is hoisted from scow to bunker by a Koehring 2-yd. crane. Aggregate, weighed by scales, is

(Continued on page 152)

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THE MODERN
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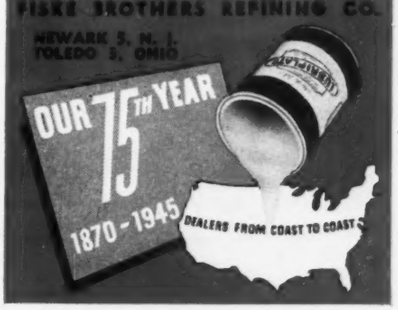

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(*Continued from page* 151)

dumped directly into trucks ready for placing in mixer. Trucks go from batching plant to the nearby cement silo. Cement is delivered by carload lots in bulk and transferred from cars to a Butler silo by a Butler cement scoop. Weighed as required for one batch, cement is dumped into separate compartments in the trucks which proceed to construction site.

Paving Equipment

Equipment used for paving includes two Koehring 34-E dual-drum pavers; two Jaeger-Lakewood finishing machines with vibrating attachment; 10 three-batch Mack trucks and 20 two-batch Ford trucks. To expedite operations, two pavers have been used simultaneously on each 25-ft. strip.

Ribbons of wood, 4 in. thick and depth as required, form the 25-ft. strips longitudinal to the apron. Set on a 2x6-in. base, they are held by stakes and gravel backing. One 10x16-in. timber drag travels immediately behind the paver as a check template on the final grade. Both finishing machines level the concrete and vibrate at the ribbons, but the first is set a little high, while the second screeder finishes at desired grade.

Crews about 30 ft. behind the finishing machine work the surface from each side by hand with a 10-ft. straightedge float. Excess water is removed and final screeding is done with a hand-operated wood screed. The surface then is worked with a metal-clad wooden speed float. Surface smoothness is checked with a 10-ft. straightedge to see that the specified tolerance of ⅛ in. in 10 ft. is not exceeded. Hand brushing completes the finishing.

Curing is by the Hunt process, the liquid for the membrane being sprayed on the surface about 5 hr. after finishing.

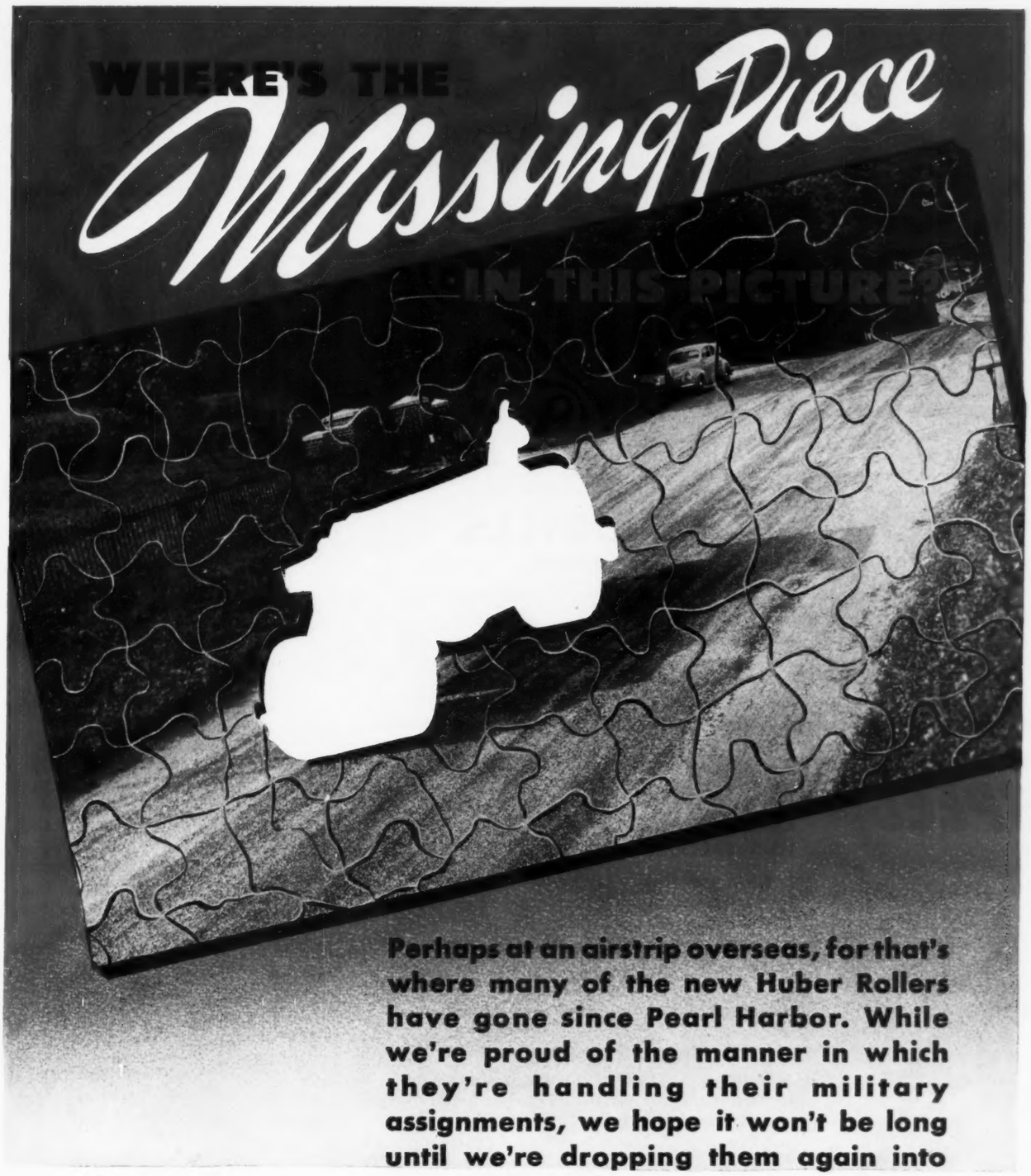
Dummy joints are set by pressing a T-section into the surface and immediately thereafter inserting a ⅛-in. premolded mastic board. All joints are finished with an edger.

For transverse expansion joints, metal forms holding premolded mastic board are placed every 100 ft. as concrete is placed, and removed after screeding machines have passed, leaving metal cap on top of mastic board. The cap is removed after finishing and the depression filled with calking mastic. Transverse joints have 1-in. steel dowels. Longitudinal expansion joints every 100 ft. are premolded mastic board, placed before pouring the adjacent strip of paving.

Personnel

N. Fiorito directs the contractor's operations, assisted by Dan Fiorito and Paul Fiorito. Subcontractors on this project in-

(*Continued on page* 154)



Perhaps at an airstrip overseas, for that's where many of the new Huber Rollers have gone since Pearl Harbor. While we're proud of the manner in which they're handling their military assignments, we hope it won't be long until we're dropping them again into scenes like this.

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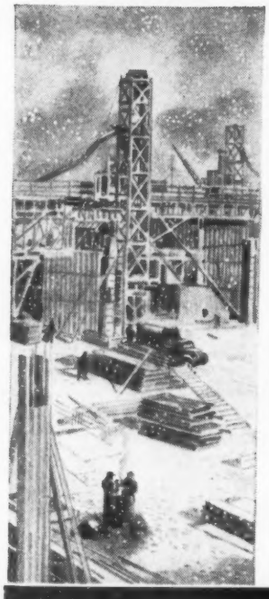
CUT FORM EXPENSE BY HALF

With* CALCIUM CHLORIDE *in the Mix



Use calcium chloride for the high early strength that gets concrete out of danger quicker in cold weather and thus saves half the expense of normal protective measures.

Use calcium chloride to secure adequate strength in your concrete to permit removal of forms in half the usual time so you can use them over again and make every dollar invested in forms do double duty.

Gains in strength with calcium chloride in your concrete are consistent with standard Portland, High Early or Air Entraining cements. These strength gains are obtained at a much lower cost with calcium chloride than with the use of additional cements or special cements. Association Bulletin No. 28, "Early Strength Concrete," gives the facts in detail.

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CALCIUM CHLORIDE

SPEEDS WINTER CONCRETE CONSTRUCTION

(Continued from page 152)

clude J. J. Agutter & Co., electrical work; J. E. Reynolds Co., pump installations; and Thorburn & Logozo, drainage work.

Supervision of the project is the responsibility of the Seattle District Engineer, Col. Conrad P. Hardy, c. e.; with Major Grant P. Gordon, chief of Operations Division; Major Leonard Bindon, acting chief of operations; C. C. Arnold, construction chief; Ormond C. Falkenbury, supervising engineer; and Glenn A. Barcroft, project engineer. Engineering design and testing for the project are directed by Major Carl Anderson, chief of the Seattle Engineer District Engineering Division, and Major Rex J. Allan, acting chief of engineering.

★ ★ ★

Air-Entrained Concrete

(Continued from page 77)

6-in. base course of bank-run slag.

Similar construction was employed for two 50-ft. taxiways totaling about 3,560 ft. long. A third taxiway, 50 ft. wide by about 3,000 ft. long, was constructed in accordance with the heaviest runway design: 12-8-8-12-in. slab on a slag base 15 in. thick.

All concrete pavement was constructed in lanes 25 ft. wide with keyed construction joints between them, as indicated by the drawing. Each lane has a longitudinal center-line dummy contraction joint and transverse dummy contraction joints at 15-ft. spacing between ¾-in. expansion joints 120 ft. apart. No reinforcing steel was placed in the pavement with the exception of slip dowels at transverse expansion joints and transverse tiebars (⅝-in. round deformed bars 30 in. long) installed only in paving lanes adjacent to thickened edges.

Concrete Mix

For improved durability and scale-resistance, the concrete was made with an air-entraining portland cement which increased the plasticity and workability of the mixture and permitted a slight reduction in the amount of water needed to produce these characteristics. In accordance with U. S. Engineer requirements based on ASTM tentative specifications for air-entraining portland

(Continued on page 156)

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...but one day soon this will be a safe, new U.S. Highway

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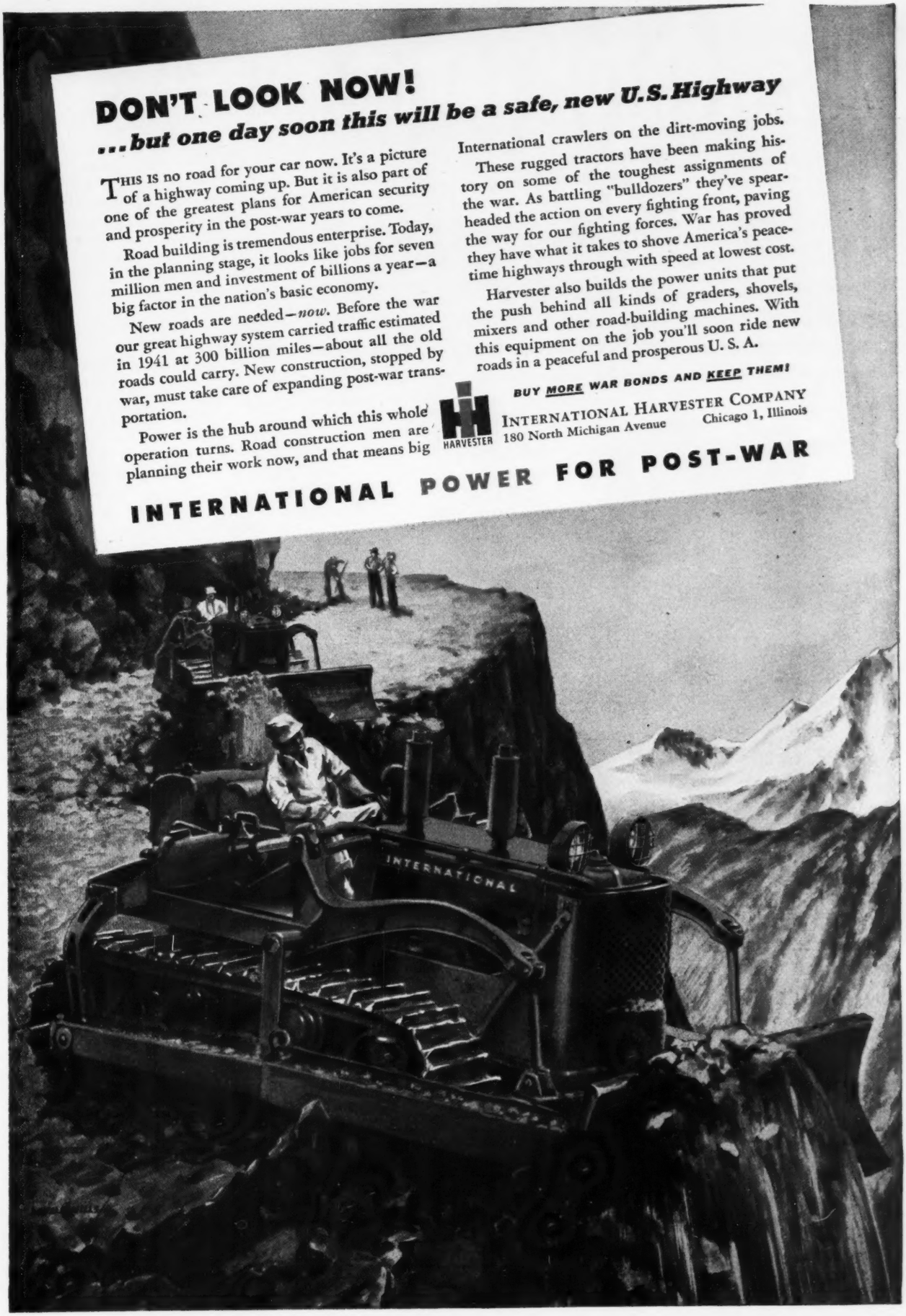

(Continued from page 154)

cement for concrete pavements, about 0.037 percent by weight of neutralized Vinsol resin was interground by the Federal Cement Co. with the cement at its Buffalo mill, in Hamburg, N. Y. This proportion of air-entraining agent introduced minute air bubbles into the concrete in an amount sufficient to reduce the weight of slag concrete containing 6 sacks of cement per cubic yard by about 4.2 percent, from an average of 141.4 lb. per cu.ft. when made with normal portland cement to an average of 135.5 lb. when made with air-entraining cement.

U. S. Engineer specifications limit total water content to 5¼ gal. per sack of cement but on this job water was held to 5 gal. Depending upon the moisture in the slag and sand, 100 to 110 gal. ordinarily was added to a 4-yd. (24-sack) batch. After rains, the added water sometimes was as low as 80 gal. Slag for the mix was in two separated sizes: large, from ¾- to 1½-in., and small, from No. 4 to ¾-in. For 1 cu.yd. of concrete, a typical batch took 825 lb. of each of these sizes (a total of 1,650 lb. of slag), 1,335 lb. of sand and 564 lb. of air-entraining portland ce-

(Continued on page 158)

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From moving a building to lifting a beam—Duff-Norton Jacks do all the heavy lifting on construction jobs.

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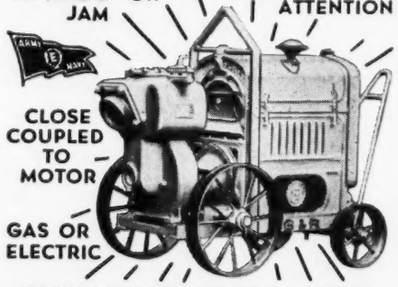

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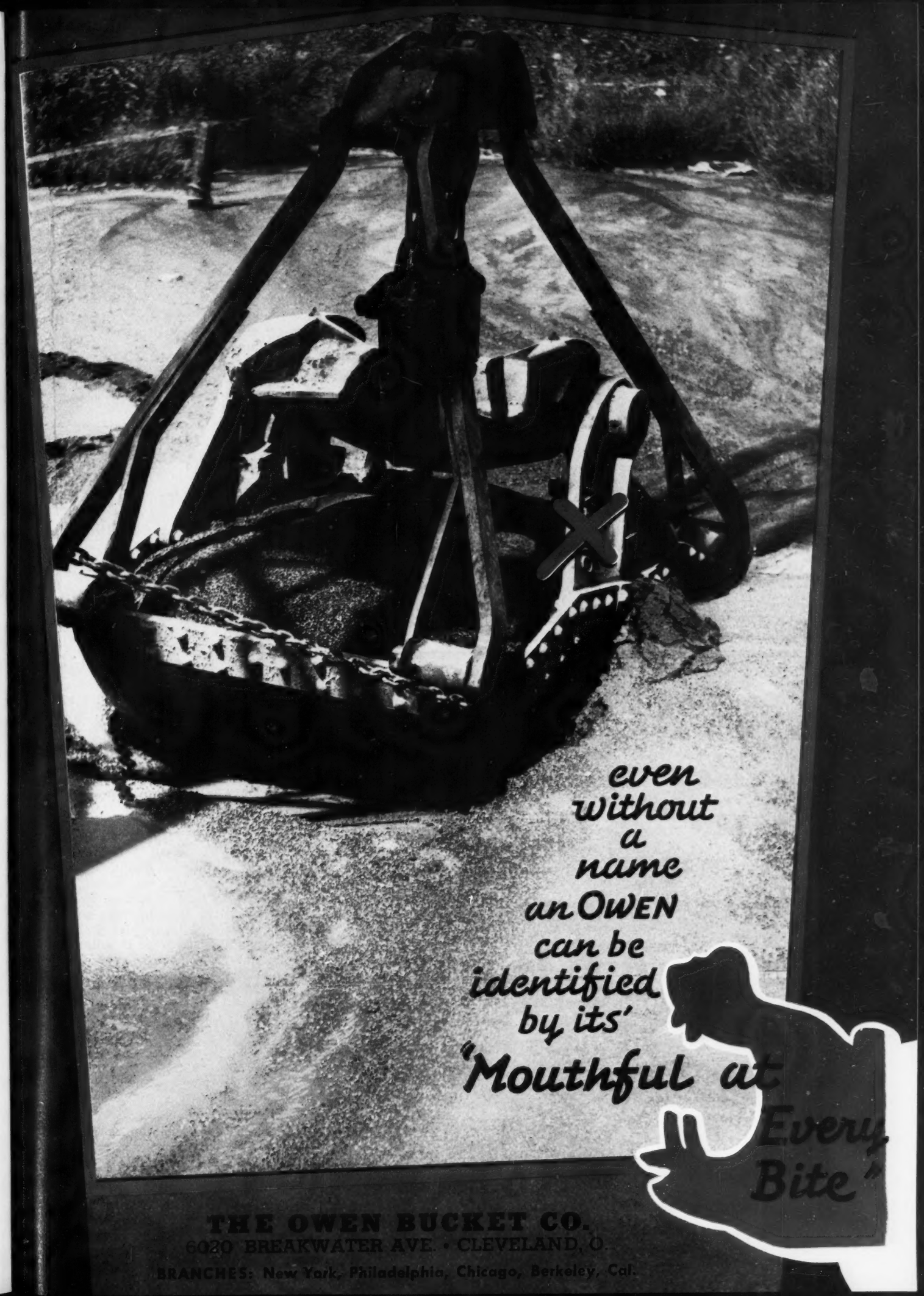
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Better, Safer Jacks Since 1899
Simplex
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Jacks

(Continued from page 156)

ment. On a volume basis, this mix is equivalent to about 1:2.36:3.01. Concrete test specimens had an average psi. on compression breaks of 5,222 lb. at age of 28 days.

Concrete Delivery

Under a subcontract, Cooney Bros., Tarrytown, N. Y., delivered mixed concrete to the pavement subgrade with a fleet of nine 4-yd. Rex Moto-Mixers mounted on Mack Cummins-diesel-powered trucks. To load the mixers, the subcontractor erected on the site a Johnson batching plant equipped with a 5-yd. weighing hopper and capable of charging a truck a minute. Mixing time for each batch was held as closely as possible to 5 min., not more, after mixing water had been admitted to the revolving drum from the tank on the truck. When paving work was moving rapidly, the water was admitted to the drum 4 or 5 min. before a truck reached its destination. On its return trip, empty, the truck driver opened a valve to let about 20 gal. of wash water into the drum from a separate tank, and this amount was deducted from the mixing water metered into the larger tank at the batching plant.

Mixing for 5 min. produced concrete which moved at a satisfactory rate down the discharge chutes as they were swung over the subgrade from the rear ends of trucks backed up to the edges of the paving lane. The chutes were not able to cover all parts of the paving lane, 25 ft. wide, and some hand shoveling was required to distribute the concrete in advance of the first pass of a Flex-Plane Panama-type two-screed finishing machine. Two trips of the finishing machine, with both screeds in operation, left the concrete surface in excellent condition for final floating, finishing and brooming. A Flex-Plane self-propelled joint machine cut the slots for the longitudinal and transverse dummy contraction joints, and workmen standing on the bridges of this machine installed steel strips in the slots to form grooves of the proper dimensions. By virtue of the elimination of surface bleeding and laitance on the surface of the air-entrained concrete, finishing operations nearly always were completed within an hour after the concrete had been placed. Hunt process emulsified asphalt curing compound then could be applied promptly with Thompson spray equipment.

Progress

Because of the urgency of the work and the short time limit set by the contract, paving operations and all other activities on the job proceeded seven days

(Continued on page 160)

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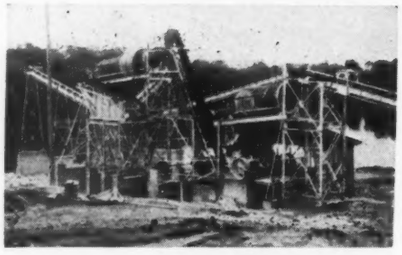

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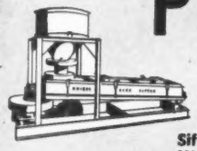

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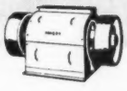

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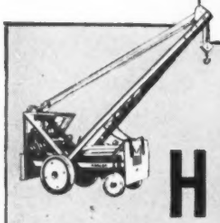
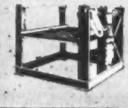
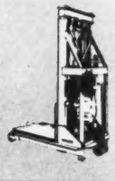


Materials
HANDLING EQUIPMENT





Trailer Trucks (All Types) Wheel Tractor Cranes (3 to 7 ton) Fork Lift Trucks, Lift Platforms, Hoists, Live Skids, Wheels, Casters.

(Continued from page 158)

a week. The first concrete pavement was placed Aug. 21. Fair weather favored the job, and paving operations were interrupted only twice by bad weather between the starting date and Nov. 4, when concrete pavement was for all practical purposes complete.

Adjustment of existing runways and taxiways to the new construction called for 19,000 sq.yd. of 2-in. hot-mixed asphaltic concrete on dry bound macadam base which was estimated to require 3,200 cu.yd. of stone. For the slag base under the concrete pavement, 52,000 cu.yd. of bank-run material and 3,700 tons of top screenings were needed.

Subgrade and Forms

Clay and silt soil sub-base for runway and taxiway pavement was graded by tractor-scrapers of 8- to 18-yd. size, hooked up to both track-laying and pneumatic-tired two-wheel tractors. Three units of the latter type, Tournapulls, hauled 8-yd. scrapers, and eight diesel crawler tractors, four Caterpillars and four Allis-Chalmers, were hooked up as needed to five other scrapers kept on the job, 12-yd. LeTourneaus and an 18-yd. LaPlant-Choate. Fills to a maximum depth of about 5 ft. were built up in 6-in. layers compacted at about optimum moisture content with sheepsfoot rollers to bearing values of 13 to 16 psi. (1,872 to 2,304 lb. per sq.ft.), as indicated by U. S. Engineer bearing tests with loaded 30-in.-dia. steel disks.

For final grading and rolling of the sub-base and subsequent slag courses the contractors operated two Caterpillar diesel auto patrol graders and four Buffalo-Springfield gasoline-powered rollers, three 10-ton three-units and one 5-ton tandem, used on pavement subgrade. The top of the bank-run slag base was struck off and rolled a fraction of an inch below finished grade, and the application of screenings at the rate of about 60 lb. a square yard, rolled and dragbroomed into the surface of the slag, brought the base up to subgrade profile.

To take care of the variations in pavement depth at the edges of the paving lanes (6, 7, 8, 9, 10½ and 12 in. deep) and at the same time allow for daily runs of 1,000 lin.ft. or more, the job was equipped with 14,000 lin.ft. of Blaw-Knox and Heltzel steel road forms. These forms were of several depths, and they were built up with bolted plank sills to serve for other thicknesses. After forms had been set to line and grade, the subgrade was checked with a Cleveland subgrade template and a Heltzel scratch template. Transverse expansion joints, supplied in 12½-ft. sections with dowel castings and shields by the Acme Steel & Malleable Iron Works, were assem-

(Continued on page 162)

ANNOUNCING

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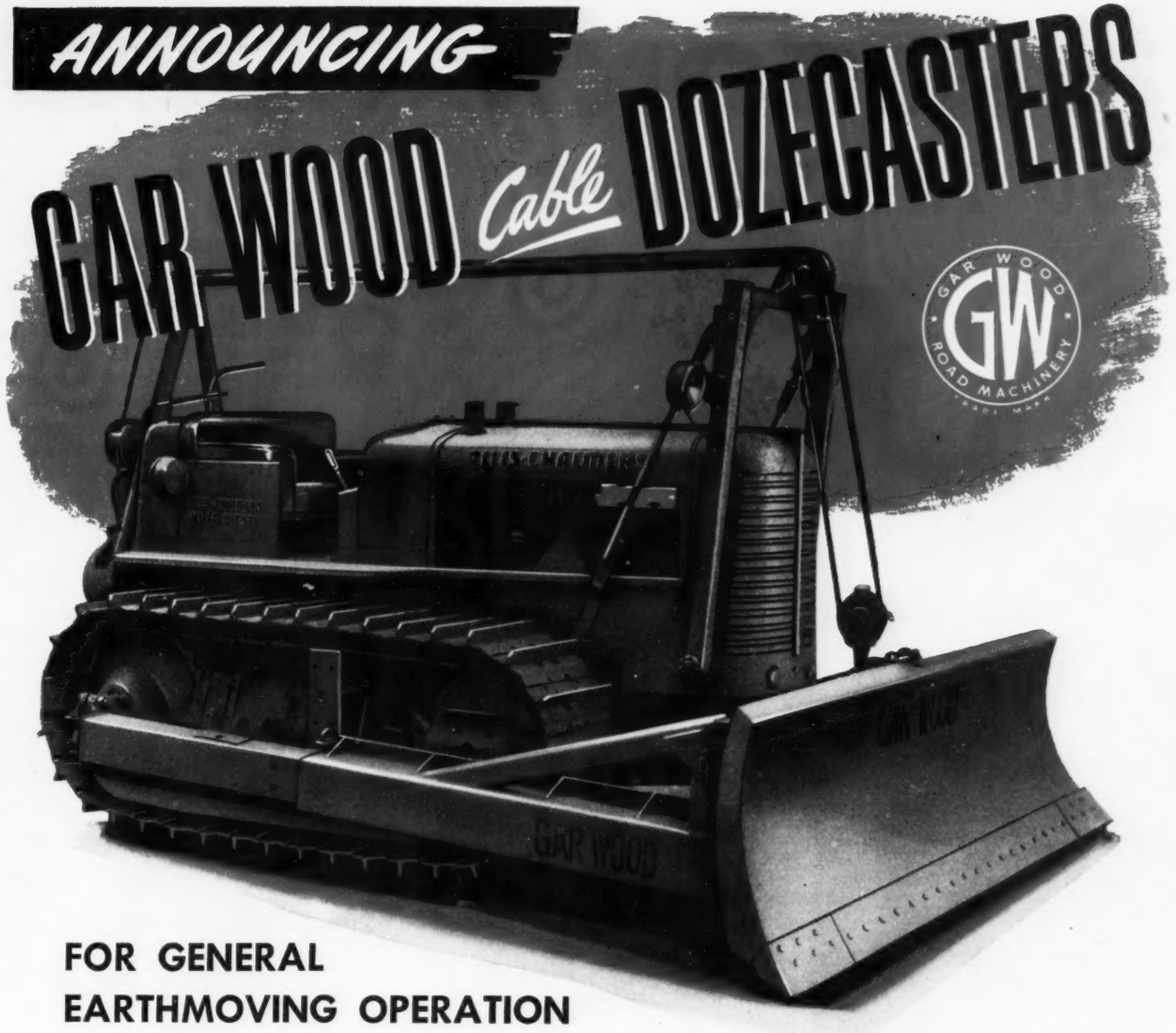

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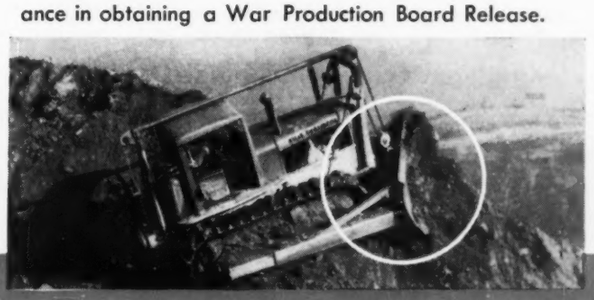

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(*Continued from page* 160)

bled at a work bench on the job and delivered alongside the paving lanes ready for installation on the subgrade. A hose spray wetted the slag screenings on the subgrade before concrete was placed.

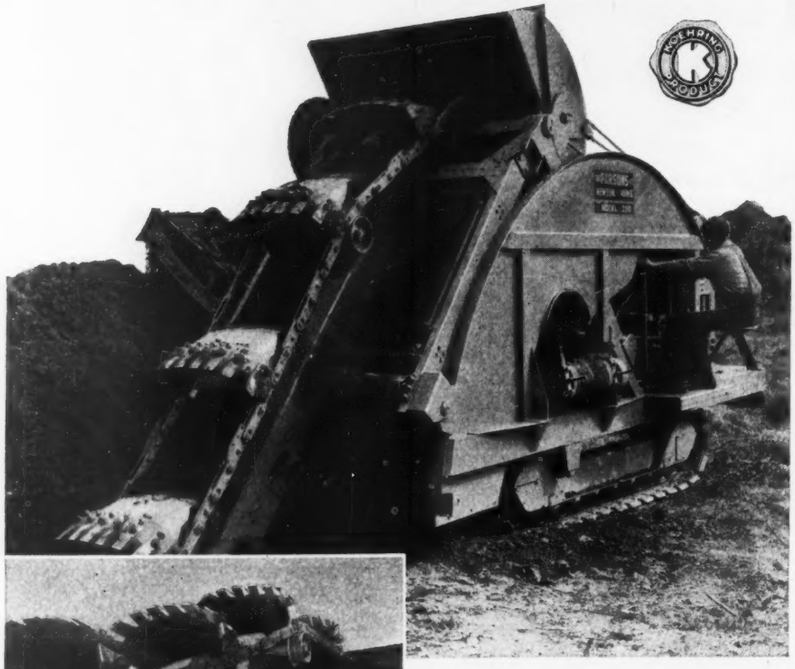
Drainage Work

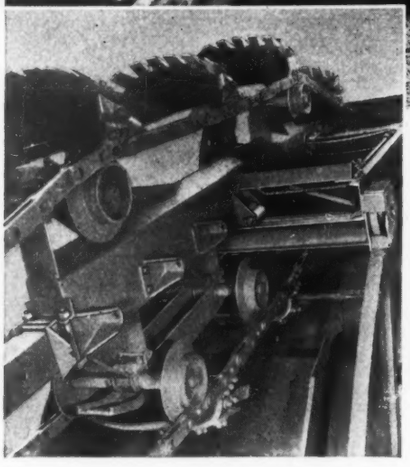
To excavate trenches for drainage pipe, the contractors rented two ditching machines. One of these was a large unit which cut trenches up to 12 ft. deep and more than 6 ft. wide for 60-in. concrete pipe. A smaller Buckeye trencher dug 12,500 lin.ft. for 8-in. concrete pipe.

For the 155,000 yd. of common excavation involved in the channel change, the contractors used two Lima 1¼-yd. gasoline draglines, which loaded three 15-yd. struck-measure tractor-wagon units powered by Cummins diesel engines. These earthmoving diesels, purchased new for the job, replaced four rented Euclids of older gasoline-powered type. Other equipment used at various times on the job included two Lorain shovels, 1¼- and 1-yd. capacities, a Byers clamshell crane, a Universal truck

(*Continued on page* 164)

PARSONS
250 TRENCHLINER





To suit varying job specifications, the digging depth of the Parsons 250 Trenchliner can be quickly adjusted to 6, 7, 8, 9, 10, 11 or 12 feet. Changes are made by lengthening or shortening the telescopic boom. Whether operating with boom telescoped to the shortest length or fully extended to the maximum length, the correct digging angle is maintained. Main boom body is heavy welded structural steel box girder construction unit. Sliding into the main boom body is a reinforced box section extension to form an adjustable high strength boom.

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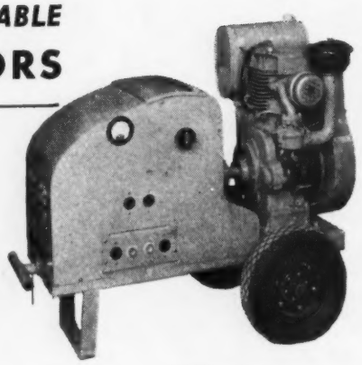

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BROWNHOIST BUILDS BETTER BUCKETS

(Continued from page 162)

crane, and three Autocar 5-yd. trucks. In conjunction with the tractor-scraper outfits, these excavators and hauling units moved an average of about 10,000 cu.yd. per 10-hr. day.

Rock Excavation

Removal of the 33,000 cu.yd. of rock encountered on the new location for the creek channel was sublet to the Fago Construction Co., Buffalo. The diversion channel has a bottom width of 30 ft. with side slopes of 1 in 2 for earth and 4 in 1 for rock. To carry this channel around the edges of the field, rock cuts to a maximum depth of 17 ft. were required. The rock consisted of limestone, sandstone and hard dolomite, and the contractor figured on using an average of 1 lb. of explosive per cu.yd. for blasting, DuPont 40 percent gelatin in the wet holes and 40 percent ammonia in the dry holes. Blast holes 6 to 8 ft. deep were drilled with two Ingersoll-Rand wagon units powered by an Ingersoll-Rand 550-cfm. diesel-engine compressor, and 6-ft. lifts of shattered rock were loaded by a Northwest 1¾-yd. diesel shovel into trucks for removal to waste piles. One shot, made with about 1,000 lb. of explosive, yielded 1 cu.yd. of broken rock per 0.7 lb. of explosive.

Supplemental drilling, especially of shallow holes, was performed with jackhammers, four Ingersoll-Rand and two Worthington. Two gasoline compressors —Worthington 315 and 105-cfm., furnished air for jackhammer drilling.

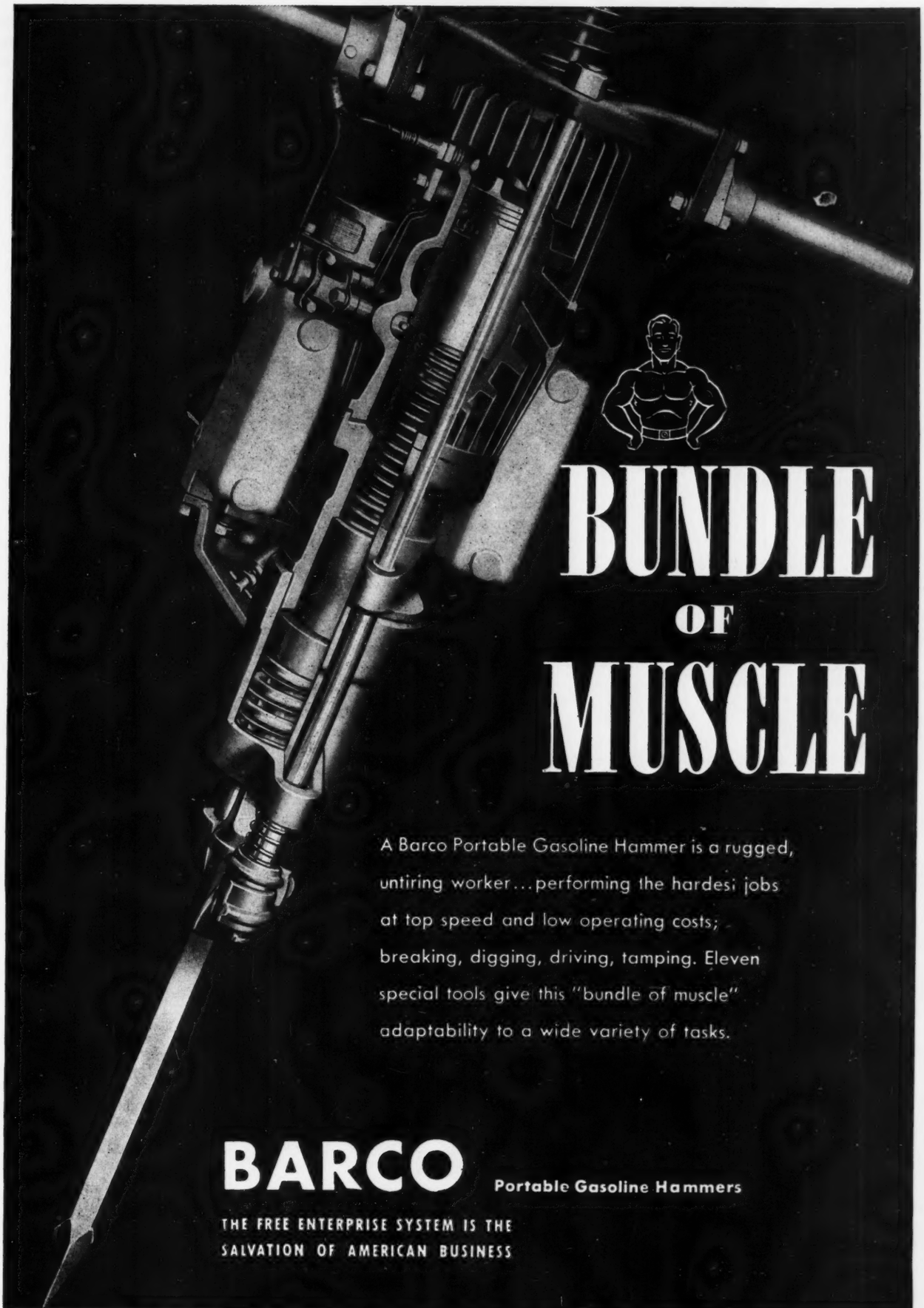
Blasted rock was hauled by a fleet of ten trucks: four Mack 7-yd., three White 5-yd. and three Pierce 5-yd., the last-named still in operation after many years' service. Two additional shovels, gasoline-powered, a Northwest 1½-yd. and an Osgood 1-yd., assisted with the excavation. At the spoil pile, material was handled by two International diesel tractors equipped with Bucyrus-Erie bulldozers.

Supervision

Expansion and improvement of the airport at Niagara Falls, N. Y., are being carried out under the direction of the New York District, U. S. Engineers: Col. Edgar W. Garbisch, district engineer; Lt. Col. David F. Fisher, chief of operations, and Maj. Robert L. Donnelly, area engineer in charge of the northern construction branch. At the airport, Dale A. Losey is resident engineer in immediate charge of all operations.

For the joint contractors, the John B. Schultz Contracting Co., Inc., of Buffalo, and the Dutcher Construction Corp., of Baltimore, John B. Schultz has given personal attention to the job, with Frank A. Ursitti as superintendent. Concrete

(Continued on page 166)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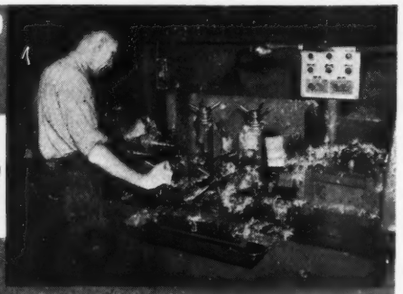

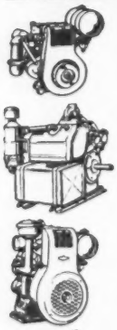

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(Continued from page 164)

operations of Cooney Bros., Tarrytown, N. Y., have been supervised by Walter P. McCann, superintendent, and Domenic S. Fago, head of the Fago Construction Co., Buffalo, has directed rock excavation on his firm's subcontract.

★ ★ ★

Highway Maintenance IN INDIANA

(Continued from page 91)

proper steps must be taken to correct it. The poor subgrade may be removed and replaced with a sandy or gravelly material meeting the following requirements:

Retained on 2-in. square sieve	0.5 percent
Retained on No. 4 square sieve	0.65 percent

The fraction passing the No. 200 sieve shall not be greater than one-half the fraction passing the No. 20 sieve, except that no material will be rejected on account of the amount passing the No. 200 sieve provided such amount does not exceed 10 percent. In some cases it is necessary to provide special drains specified by the district office.

(7) High-early-strength concrete shall be used for the patches.

(8) The subgrade must be moist when the concrete is placed. The edges in place shall be thoroughly moistened.

On force account work transit-mix concrete is purchased if it is available. If not, two-bag mixers are used. A liquid membrane curing compound is used in curing the concrete patches. Curing is continued and traffic kept off the patches until test beams indicate that the concrete has attained a strength of not less than 550 lb. per sq. in. modulus of rupture.

The location, size and shape of the patches should be as follows:

(1) In general, all sides of a patch will consist of straight lines.

(2) If there is an existing crack near

(Continued on page 168)

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to Tokyo, and to the time when new and greatly improved models of Byers shovels and cranes will be available for delivery to you.

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Distribution will continue to be conducted through independent, territorial construction equipment distributors of the highest type, and in whom you may place confidence.

THE BYERS MACHINE CO.

★ Ravenna, Ohio ★

Distributors throughout the World

(Continued from page 166)

the point where a patch is to end, this crack may become one side of a patch, providing it is in an approximate straight line.

(3) The edges of the patch must be straight enough so that the maximum deviation of any point on the edge from a straight line connecting any two points on the edge shall be:

Deviation	*Length of Straight Line*
6 in.	9 ft.
4 in.	5 ft.
2 in.	2 ft.

(4) The ends of a patch shall be approximately at right angles to the centerline and shall not deviate more than 30 deg. from a right angle.

(5) Patches shall extend from the edge of the pavement toward the centerline, either a distance of from 4 to 6 ft. or to the centerline. They may also extend from the centerline toward the edge a distance of from 4 to 6 ft. This is to

(Continued on page 170)

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CHROME CLAD

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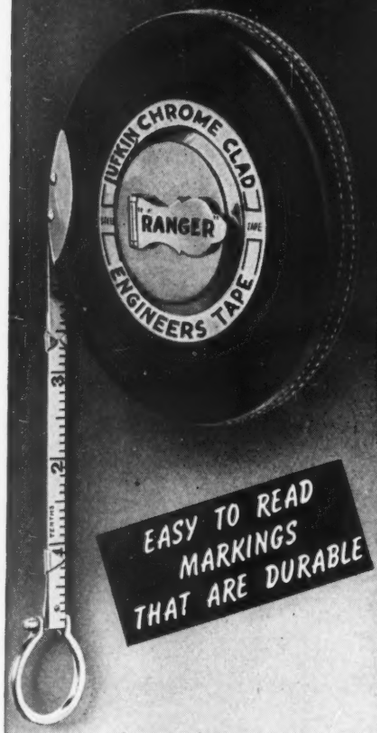

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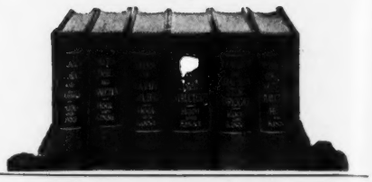

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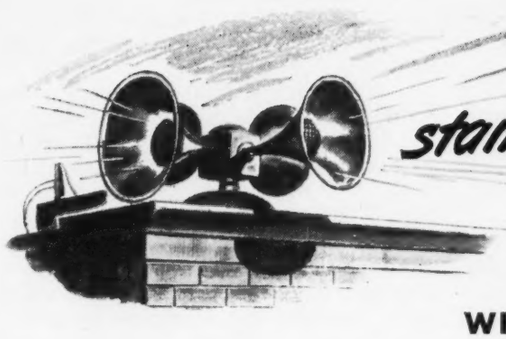

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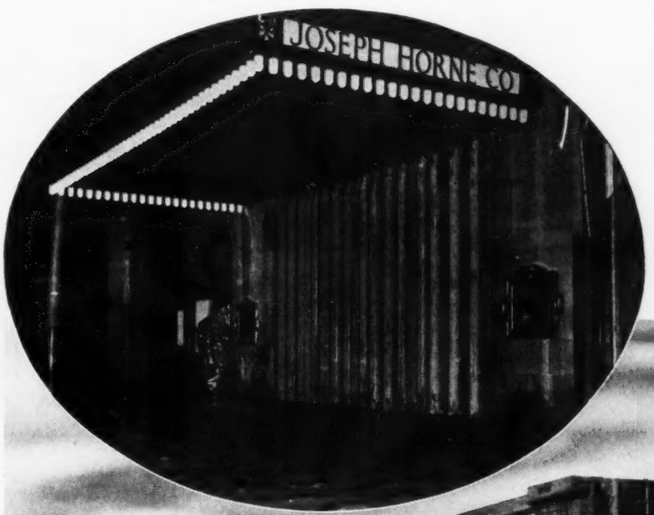

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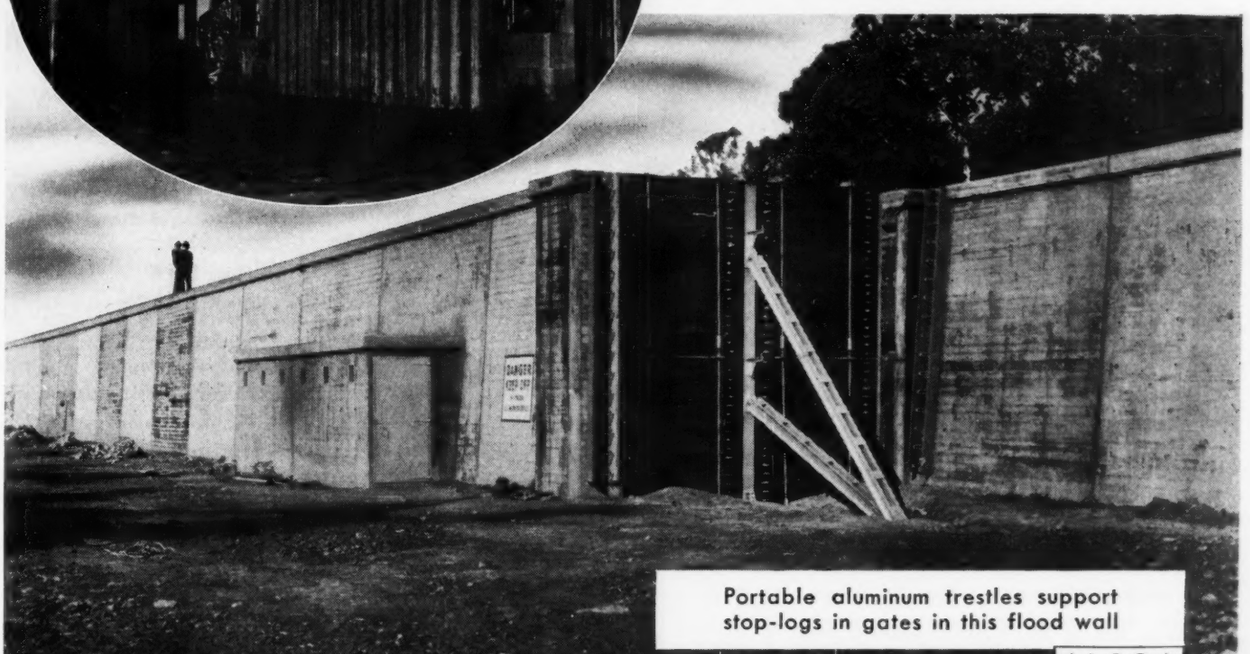

Portable aluminum trestles support stop-logs in gates in this flood wall

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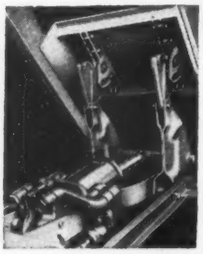

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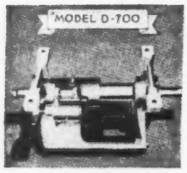
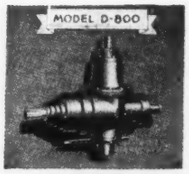


Direct (D-700 Series), Side (D-800 Series) and Dual Drive (B) models are available for operation of almost every possible type of truck-mounted equipment, either singly or in combination.

Recommendations and complete specifications upon request.



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(Continued from page 168)

prevent a longitudinal joint from falling within a wheel track.

(6) All patches shall be not less than 4 ft. in length, if there are no joints or cracks immediately adjacent. They shall extend not less than 4 ft. on one or both sides of a contraction joint and not less than 6 ft. on one or both sides of an expansion joint.

Dips in concrete surfaces are corrected by using a mud jack, but this method has been reduced to a minimum because of the small number of mud jacks available and the inability to purchase new ones. Work of this nature is expensive and is used only on concrete surfaces that are generally in good condition and are not expected to be replaced for many years.

Surfaces that cannot be corrected easily with a mud jack are patched. When possible, hot or cold bituminous mixtures are purchased from commercial plants and delivered to the site of the repair. If this is not possible, small bituminous mixers are used to produce a cold mix at the location of the repair. Standard practice used in all patch work includes thorough rolling and opening to traffic as soon as possible. Traffic can use one lane of the surface at all times while the work is in progress.

Some failing pavements that do not carry an excessive amount of heavy truck traffic have been given a standard drag-type surface treatment which is described later under bituminous surface maintenance. This is satisfactory when the subgrade is good and the repair is expected to be temporary. To obtain desired results, traffic is always detoured.

Resurfacing Methods

The war has created a new problem in cement concrete repair. Many miles of failing concrete pavements are located on roads having poor alignment and grade. The regular skin patch will not do the job and manpower, materials and equipment are not available to patch it with concrete. Wherever commercial bituminous plant mixtures are available, this problem is solved by purchasing this material f.o.b. the point of repair and applying it by means of a mechanical spreader in layers varying from 1 to 2 in. This is rolled, sealed if necessary, and opened to traffic. This, in effect, is patching by the resurfacing method because the length of repair may vary from 100 to 1,000 ft. We have found this to be the most economical method of production patching.

Some roads failed so badly that they became impassable. In these cases, the old concrete was removed or broken into small pieces by means of an iron ball. When the concrete had been removed

(Continued on page 172)

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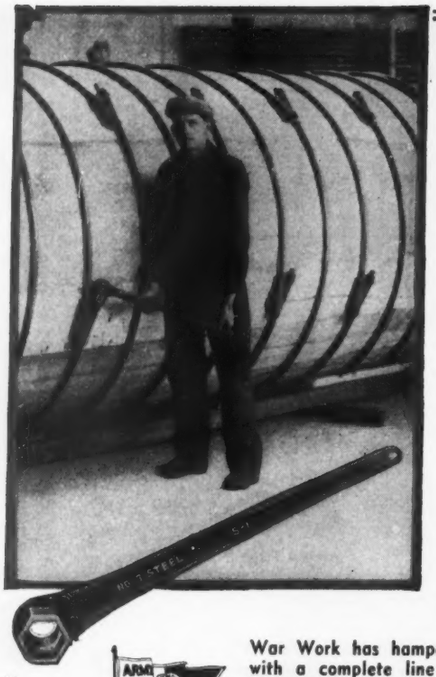

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(Continued from page 170)

it was replaced with loose aggregate approximately 15 in. deep. When the aggregate became stable, an emergency winter bituminous patch was applied.

Cracks and joints in cement concrete pavements are poured when they are open, which is in the late fall and winter. Liquid asphalt RC3 is used for the cracks and a low penetration asphalt filler is used for the joints. By performing this operation in cold weather a maximum amount of asphalt is placed in the crack or joint and the material will not track because it congeals rapidly. This eliminates the use of a blotter which builds up cracks and joints.

Indiana has very few drag-type surfaces. It has been standard practice to apply aggregate and drag a surface of this kind the first winter and apply a bituminous dust palliative the following summer. This permitted additional aggregate to be added the second winter and a road oil mat applied the following summer. Any portions of the surface that failed could be scarified, additional aggregate and road oil added and matted again. This could be done easily because road oil is soft and the surface could be scarified readily.

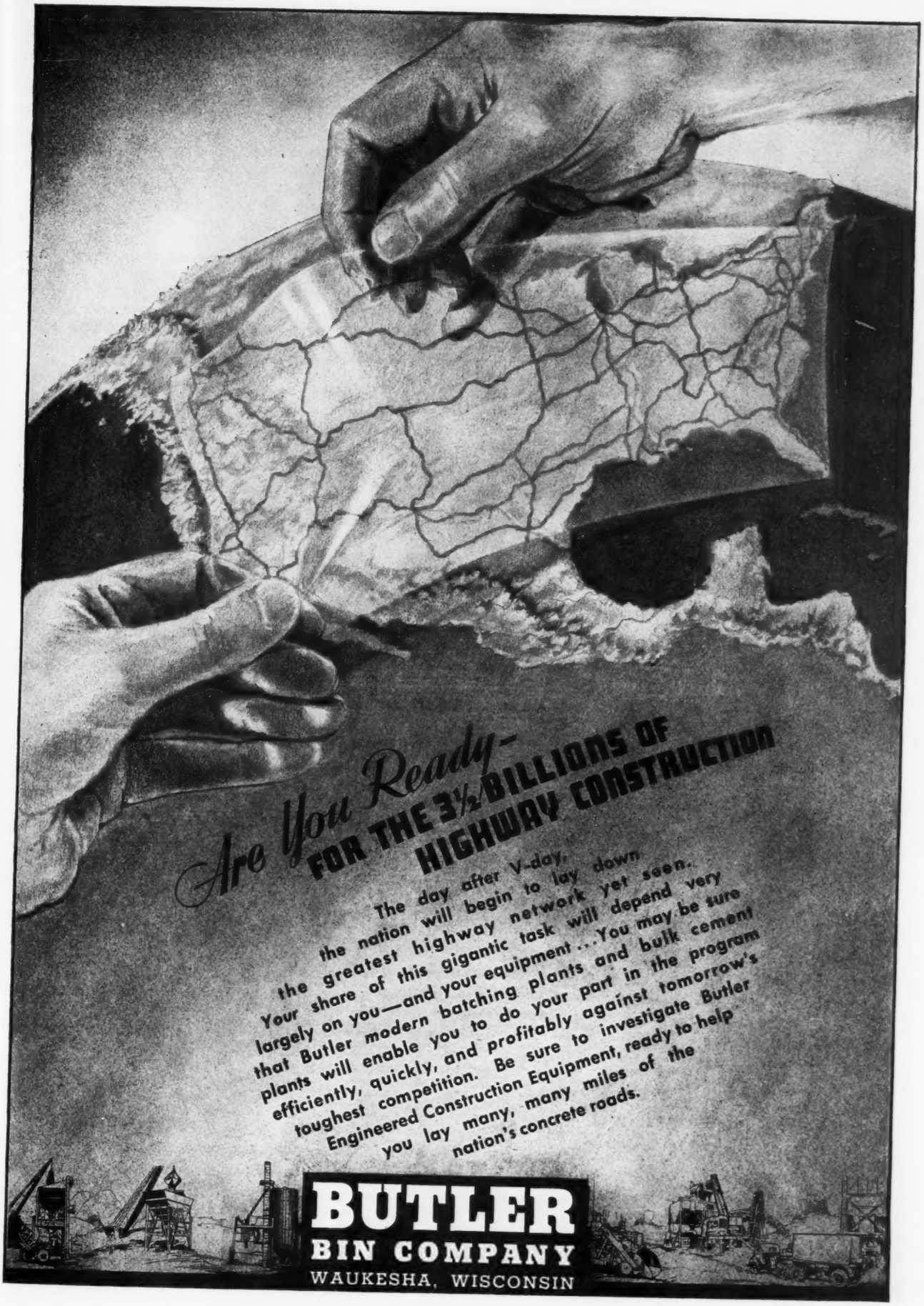
Road oil has been restricted and tar, emulsified asphalt or medium curing cutback asphalt has been substituted. The results are not as good because these materials are tougher, which makes the mat more difficult to scarify. By using the mat method only those portions of the road that fail need to be treated until all of the weak portions of the road are eliminated. Often this is a small part of the entire area.

Bituminous Surfacing

The bituminous mat is constructed by windrowing the excess aggregate on the shoulders and priming the base. A small amount of aggregate is pulled onto the prime and it is permitted to cure. After the prime has cured, a mat is constructed varying in depth from ½ to ¾ in. by applying from 45 to 65 lb. of aggregate and from 0.4 to 0.6 gal. of liquid asphalt SC 3 per sq. yd. of surface. This is first mixed with blade graders, then further mixed and spread with multiple-blade maintainers having a wheel base of at least 18 ft. The surface is finally rolled. A light seal of approximately 0.10 to 0.15 gal. of SC 3 and about 10 lb. of chips are applied per sq. yd. and thoroughly rolled with a 10-ton roller.

An intermediate type of bituminous surface that is rough is given a drag type surface treatment. For this treatment either liquid asphalt RC 3, emulsified asphalt or tar RT 9 is used. After the surface has been cleaned by broom-

(Continued on page 174)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CARVER CENTRIFUGAL Certified PUMPS

(Continued from page 172)

ing, a prime of about 0.10 gal. of bituminous material is applied. Covering aggregate varying from 40 to 50 lb. per sq. yd. is applied to the prime by means of an aggregate spreader backed over the surface. The covering aggregate is penetrated with from 0.35 to 0.55 gal. of bituminous material per sq. yd., thoroughly mixed and leveled by means of multiple-blade maintainers after which it is lightly rolled. The mixture is then sealed by applying 0.15 gal. of bituminous material and 10 lb. of chips which are broom-dragged to secure a smooth surface. This seal is thoroughly rolled with a 10-ton roller and opened to traffic.

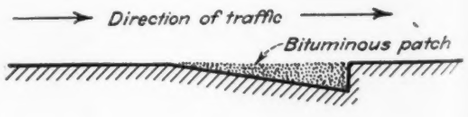
The aggregate specifications are as follows:

	Covering Aggregate	*Chips*
Size	*Percent retained on square sieves*	*Percent retained on square sieves*
¾ in.	0	
½ in.	10-35	0
No. 4	85-100	20-50
No. 8		65-100
No. 30	99-100	96-100
No. 100		99-100

A bituminous surface that has satisfactory riding qualities, but should be waterproofed or is slick, is given a seal treatment by applying from 0.20 to 0.25 gal. of bituminous material and 15 to 20 lb. of chips per sq. yd. of surface. These chips are broom-dragged, thoroughly rolled and opened to traffic.

Patching Bituminous Surfaces

Bituminous surfaces are patched with the same materials with which they were constructed. Equipped with a pump and spray nozzle, 300-gal. tar kettles apply the bituminous material to small areas that are to be skin-patched. Bituminous material is covered with chips and either hand-tamped or rolled with a portable roller. A hot or cold bituminous plant mixture should be used for repairing holes and depressions. The loose portion of the failure to be repaired should be cleaned out so that the bottom of the patch will be an inclined plane leading



into a vertical wall, as shown in the accompanying sketch. The vertical wall prevents the patch from creeping.

After the area to be patched has been prepared it should be primed with bituminous material and the mixture placed and straight-edged, leaving it higher at

(Continued on page 176)

Where will you stand if you DON'T insist on this margin of Superiority?

Big though the post-war construction boom promises to be, the signs all point to contracts awarded on the basis of narrowly figured costs. And where will you find a margin over competition if not in the equipment that turns blueprints into finished jobs? Where will you stand if you *don't insist on* the equipment with the utmost speed, economy, and dependability? That is why shrewd contractors are opening up the question of "*what* equipment?" all over again, and this time making the choice on the basis of cold and factual comparisons. If *you* do *that,* you will come out with the same answer as a growing number of other contractors. 92 years of Sullivan "know-how" is more than just a catch phrase. It means extra footage drilled, extra economies in maintenance, extra length of service...jobs finished faster. Arrange *now* to be high on a priority list that later will be crowded. . . . SULLIVAN MACHINERY COMPANY, Michigan City, Ind. In Canada: Canadian Sullivan Machinery Co., Ltd., Dundas, Ont.

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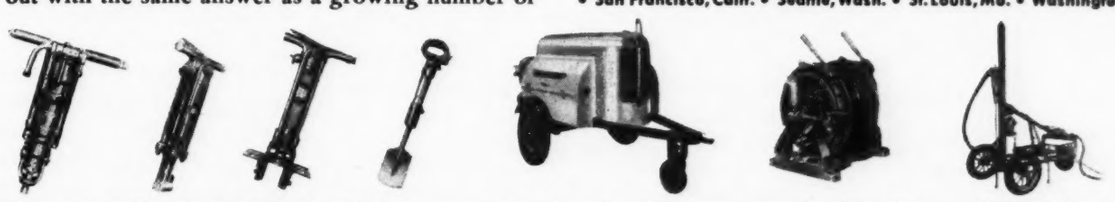

From left to right: Sullivan L-57 drill, K-81 Paving Breaker, Q-81 Sheeting Driver, M-2 Spader. Through most of the line the famous Sullivan Dual Valve is used . . . self evident proof of this exclusive feature's functional superiority.

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(Continued from page 174)

the deep end to compensate for compaction which takes place when tamped or rolled. A patch will compact about 25 percent. Small patches are tamped, but most of them are rolled with portable or larger self propelled three-wheeled rollers.

Hot or cold bituminous mixtures are purchased from commercial plants wherever possible. In other places small bituminous mixers are used to prepare a cold mix composed of aggregate and rapid curing cutback asphalt RC3. The size of the aggregate depends upon the depth of the patch.

This is the first of two articles dealing with wartime highway maintenance in Indiana; the second will appear in an early issue.

★ ★ ★

Access Roads

(Continued from page 85)

ter material from a nearby borrow pit.

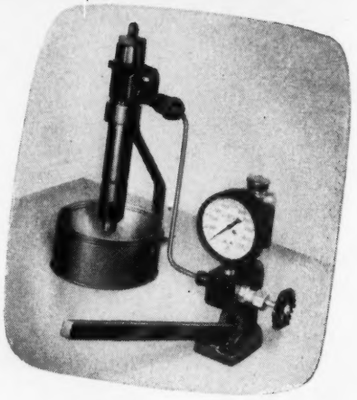
Small Crew—Only six men were included in the crew employed on the job by the contractor. In addition to the resident superintendent, the force comprised two machine operators and three laborers. The operators were kept busy on a Bucyrus-Erie ¾-yd. gasoline-powered shovel, used for grubbing, excavating to grade and side-casting, and a Caterpillar diesel tractor, 35-drawbar-hp.-capacity, equipped with a LaPlant-Choate hydraulically controlled bulldozer. A Caterpilar 8-ft. road grader, drawn by this tractor, worked on the final grade.

To break up granite boulders ranging to 8- and 10-yd. size, encountered in many places along the 2-mi. location, the contractor used an Ingersoll-Rand 105-cfm. compressor supplying air to a Sullivan hammer drill. Drilling was done with Sullivan detachable bits. This outfit also drilled blast holes into ledge rock in the few locations where it outcropped into the roadway. All blasts were made with American Cyanamid 40 percent gelatin dynamite.

Quantities handled under the contract had to be adjusted to stay within the sum of about $15,000 available for construction out of the $16,000 allotment. Within the allowable limit, it appeared that the

(Continued on page 178)

ADECO NOZZLE TESTER



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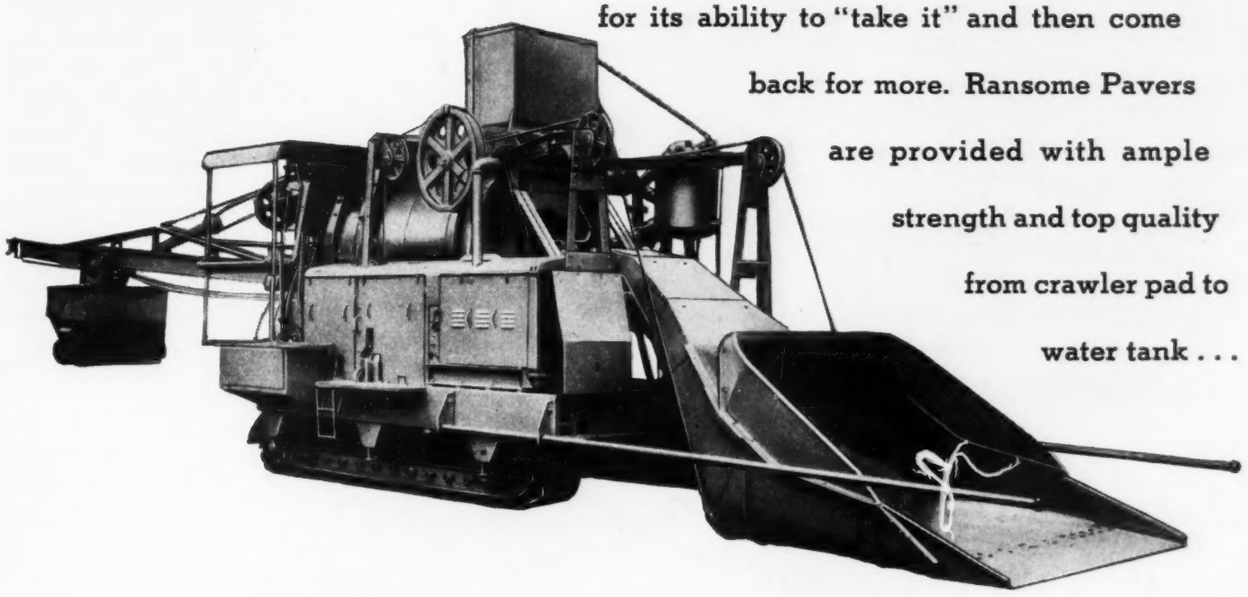

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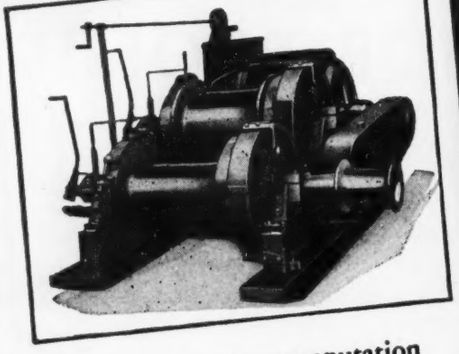

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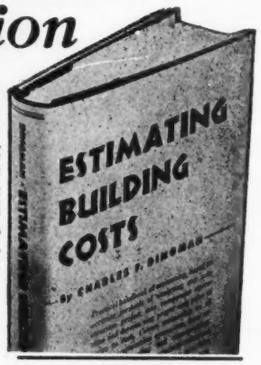

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This practical guidebook of estimating trains the estimator to analyze every construction job into its component parts, to apply cost data, adjusted to living conditions, to the several operations necessary, and to calculate a price that will approach the actual cost of doing the work as closely as is humanly possible.

ESTIMATING BUILDING COSTS tells how to make an estimate on a wood, brick, or concrete building construction, and covers every operation from excavating to roofing and waterproofing —with valuable material on such important details as fireproof construction, shingling, steel sash, or cement gun work. Included also are a number of useful data tables, but its primary purpose is to give the step-by-step methods that will train the reader to become a thoroughly competent estimator. This book helps you to make sure that no element of the work is overlooked, and explains the special factors to watch in dealing with each type of work.

While essentially a book of methods, ESTIMATING BUILDING COSTS contains 227 data tables and other useful reference features for the estimator, such as a reminder list of job elements, and a number of practical mathematical formulas.

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(Continued from page 176)

quantities and costs, based on unit prices, would be about as follows: Clearing and grubbing, 6 acres at $300, $1,800; unclassified excavation including earth borrow, 5,000 cu.yd. at $1.25, $6,250; unclassified trench excavation, 200 cu.yd. at $3.00, $600; selected earth borrow, 3,700 cu.yd. at $1.25, $4,620; 15-in. plain concrete pipe, 400 lin.ft. at $2.00, $800; two 10-ft.-span log culverts at $200, $400; and one 16-ft.-span log culvert, $250.

Preliminary Investigation

As necessary with all access roads, the project was initiated by an application of the lumber company pointing out the possibilities, and the War Production Board then thoroughly investigated the project with the aid of timber experts borrowed from the U. S. Forest Service and engineering advice of the Public Roads Administration and the New Hampshire Highway Department. After the project had been studied and approved as feasible, economically sound and helpful to the war effort, an allotment was made to take care of the cost, and the state highway department was authorized to take charge of all engineering and construction, including the advertisement for bids and award of contract.

Access Projects

New Hampshire has been building access roads for PRA on WPB order for two years. The 16 projects placed under contract during 1944 averaged about 4 mi. in length, with the timber roads generally exceeding the mica access projects. Timber roads have run to 8, 11, 12 and 15 mi. long. For all the access roads in the 1944 program, costs averaged about $7,000 a mi. ranging from a low of about $4,500 to a high of about $8,000. The graded surface width of the roads on these projects normally has been 12 ft., with turnouts provided at suitable intervals.

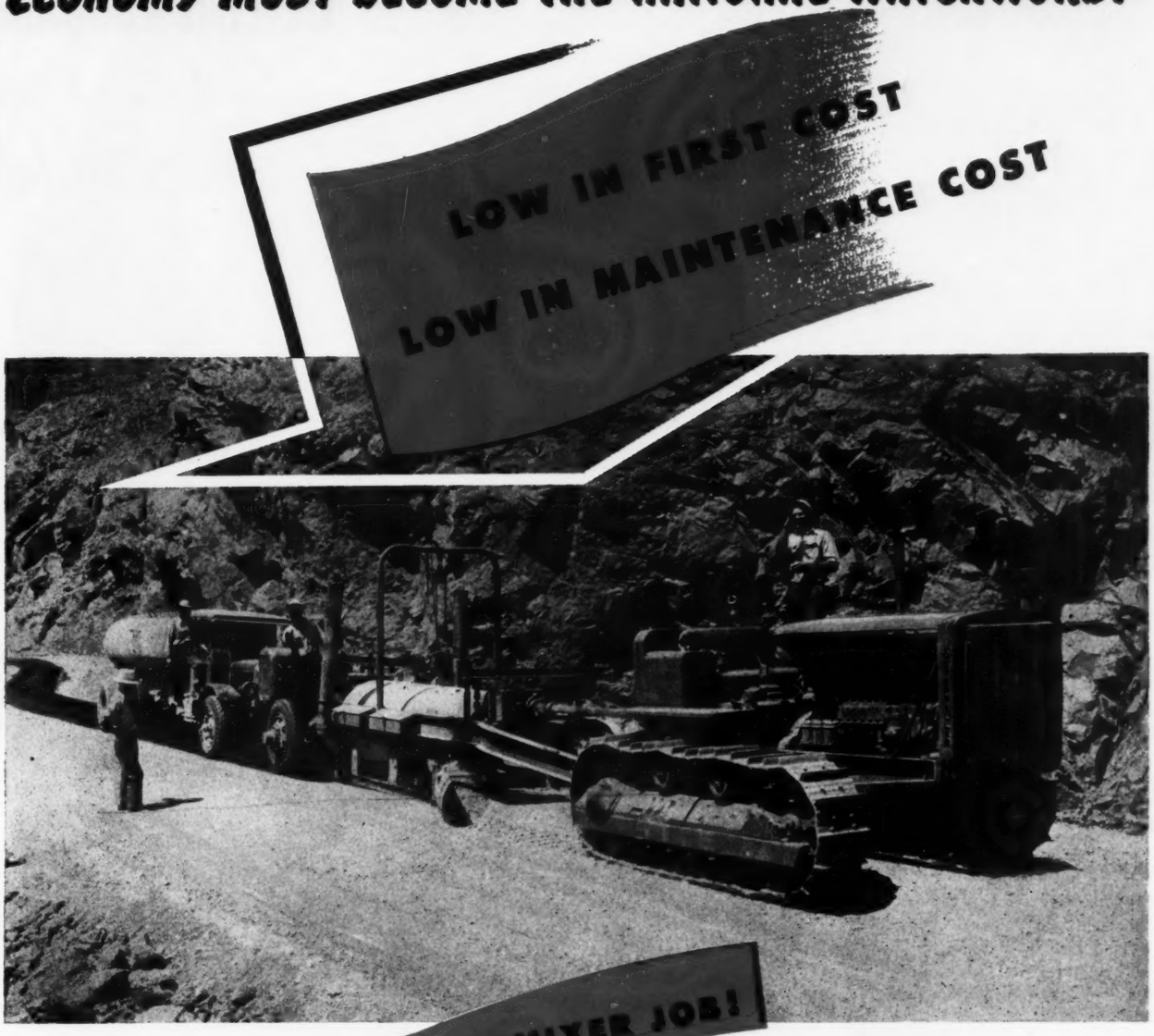
Supervision

Construction of the access road described in these notes has been under the immediate supervision of Richard F. Townsend, resident engineer for the New Hampshire Highway Department, acting under the general direction of John O. Morton, construction engineer. Frederic E. Everett is commissioner of the State Highway Department, and Daniel H. Dickinson is chief engineer.

For Arthur Whitcomb, contractor, Keene, N. H., G. Allen Mott, general superintendent, paid frequent visits to the job, where Glenn Wright, superintendent, was in continuous charge of

(Continued on page 180)

ECONOMY MUST BECOME THE NATIONAL WATCHWORD!



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The Wood Roadmixer is the world's pioneer and leading travel plant method of pavement construction. Sold by leading equipment dealers everywhere. For literature and prices, see your nearest Wood Roadmixer dealer or write direct.

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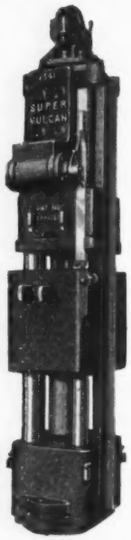
The open type fits the same leads and uses the same accessories as the VULCAN Single-Acting Pile Hammer.



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18C—30C—50C—80C
meet all needs

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(Continued from page 178)

operations. Leonard A. Thibodeau, in charge of all truck roads for the Parker Young Co., Lincoln, N. H., represented the lumber operator.

★ ★ ★

Repair Shops IN KANSAS

(Continued from page 81)

graders, 20 air compressors, 20 road brooms, 150 tar kettles, and a total of 210 passenger cars.

A complete history is kept of each piece of equipment, its original cost, repair work, including parts and labor costs, gas, tires and license fees, from the time it is purchased. In this way the accounting department is able to maintain an operation chart for each piece of new equipment as it is assigned through a rental setup to each district from division headquarters.

Typical Division Shop

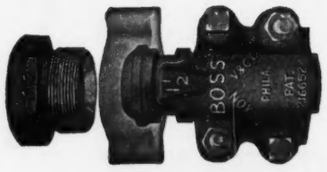
Division I at Topeka has an inventory of $506,319 worth of road equipment. To take care of this equipment in the division shop is a staff of nine men, including a welder and painter, under C. L. Cave, shop foreman, and $30,566 of shop equipment and tools. An average monthly repair bill will amount to $8,000. None of this repair is done outside the division shop.

Most of the various departments of operation in the division are under the same roof. The equipment repair and service shop is divided into a heavy repair shop on the basement floor and a light mechanical repair shop on the first floor. Both shops, divided into several departments, including paint, electric, welding, machine and tire, occupy a total of 7,200 sq. ft. on each floor. Directly adjoining the light repair shop is a well replenished stock room occupying 2,850 sq. ft., and general office space amounting to 5,160 sq. ft., affording direct contact between shop personnel and the division engineers.

Also, in the division building is a short-wave, two-way radio station, serving in conjunction with the state highway patrol. This two-way radio station system has facilitated prompt action in many emergencies. The maintenance department, with a substantial number of

(Continued on page 182)

DIXON Couplings ...for Every Road Construction Job!



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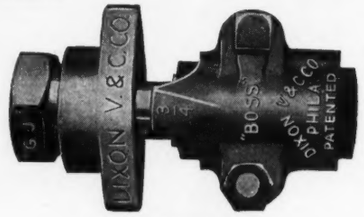

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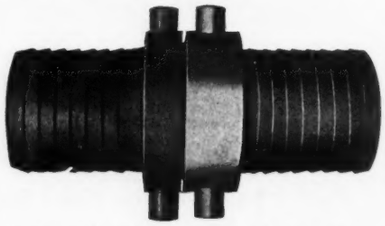

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DRAGLINE BUCKETS

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(Continued from page 180)

receivers for mobile units, has come to the relief of operators of automotive equipment trapped by flood-waters or stuck in snowdrifts.

The division chief mechanic also serves in the capacity of OPA official tire inspector for the fleet of trucks and other equipment in his division. The highway department was recapping tires, as an economical measure, long before rationing went into effect. Now, with reduced motor vehicle speeds, increased caution and attention to tires, and the elimination of unnecessary mileage, the department has increased the life of its tires by 25 percent.

Personnel

W. K. Dinklage, the division engineer, is ably assisted by M. E. Trueblood and E. L. Siedel. Mr. Trueblood coordinates the work of the division maintenance crews and is directly responsible for the operation of all equipment in the division. Mr. Siedel serves as office administrator and acts as an aid to Mr. Trueblood in field problems. A division clerk keeps a detailed record of all supplies and equipment throughout the division.

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The photograph shows part of the Fontana Dam job where cement is handled in a Robinson Air-Activated Conveyor.

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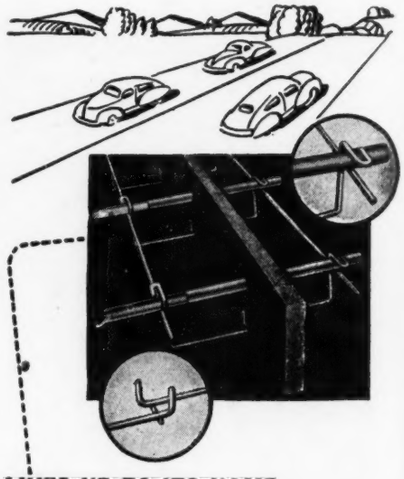

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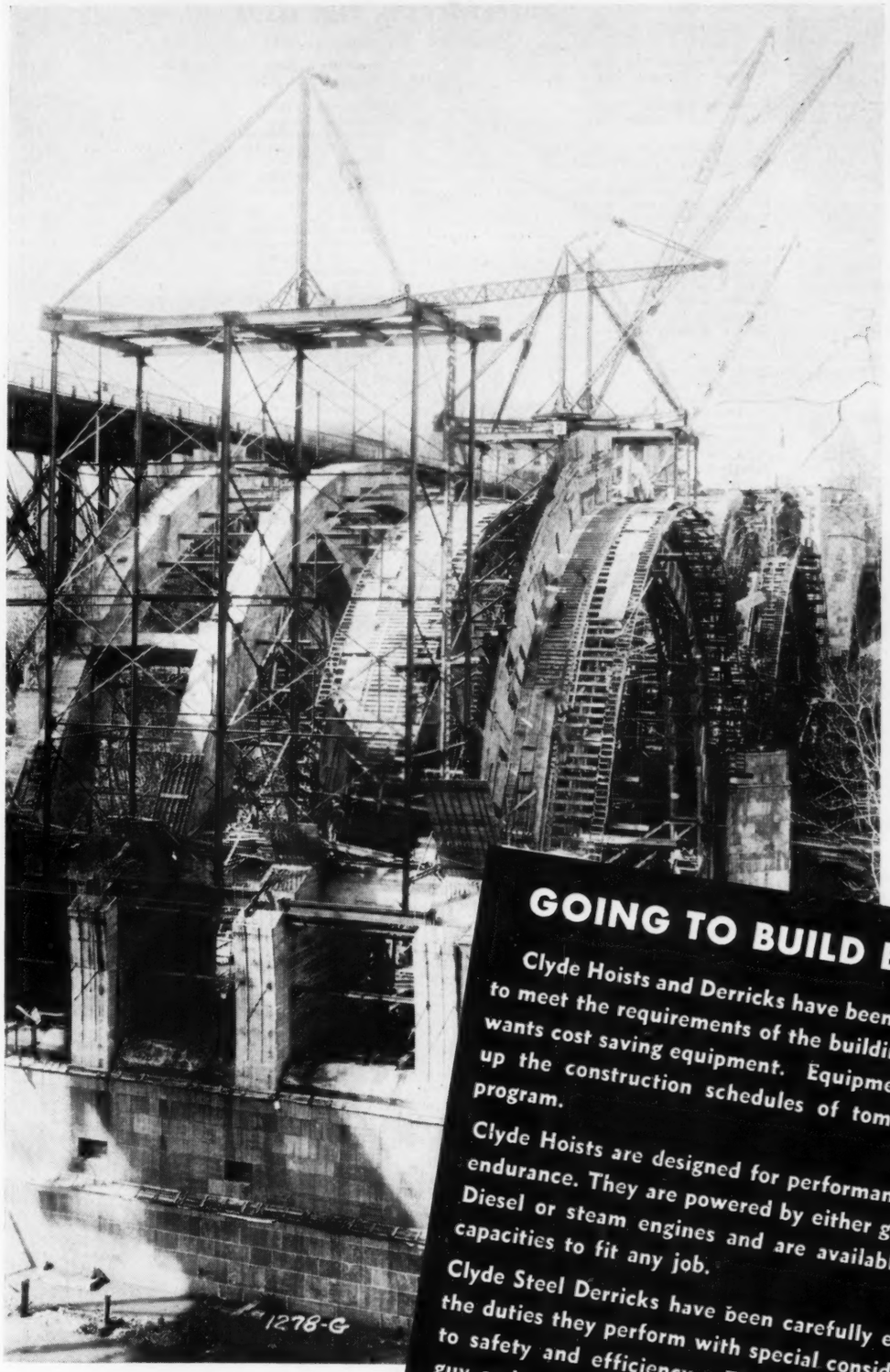

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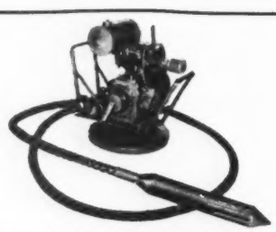

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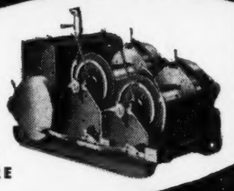

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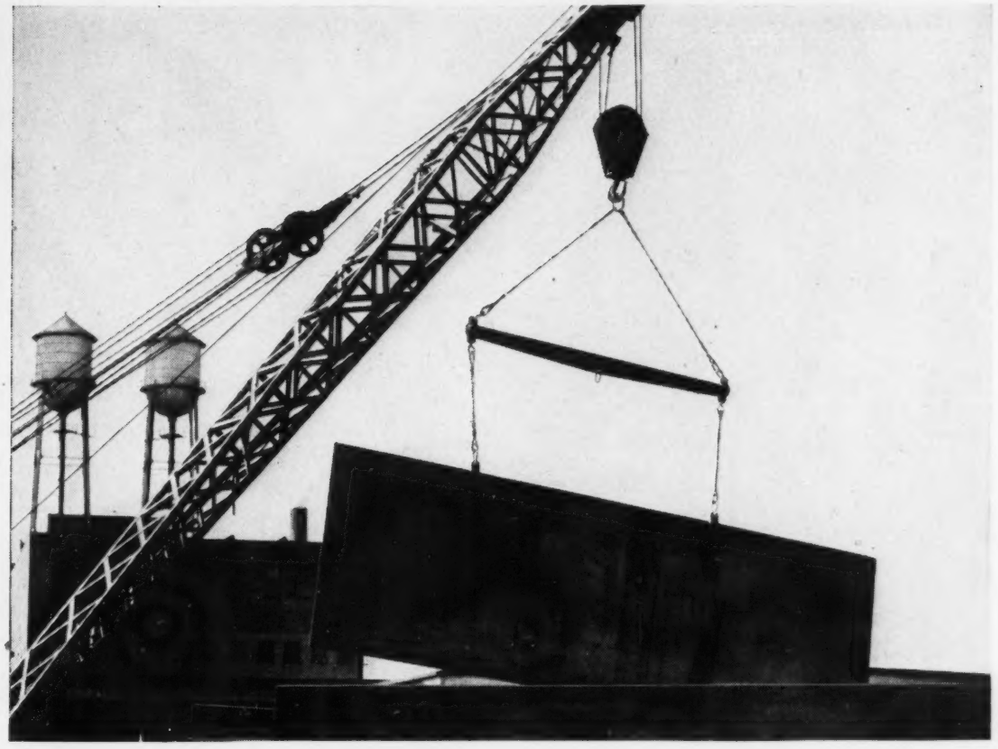

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PC 4-19

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